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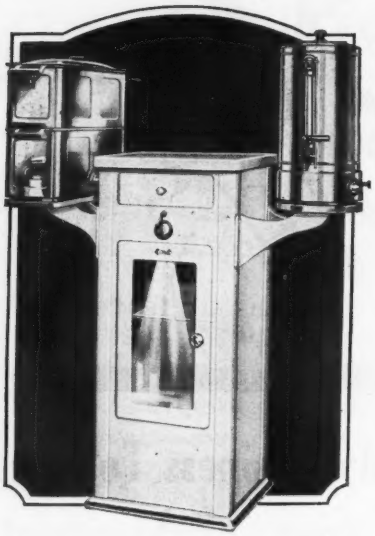

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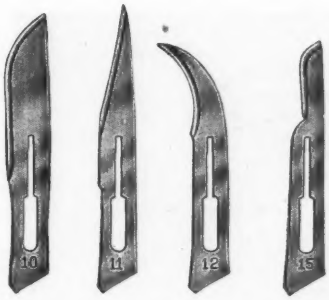

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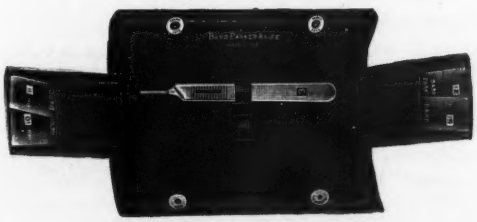

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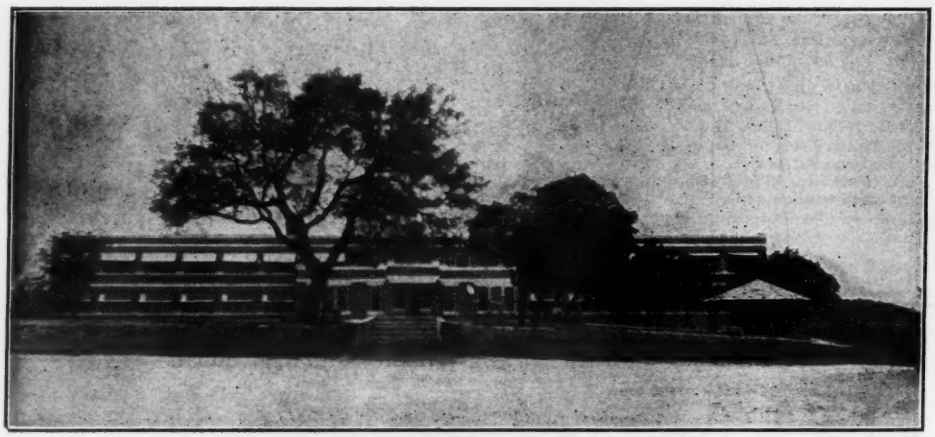

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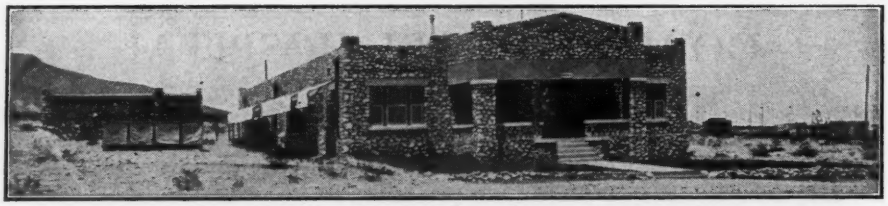

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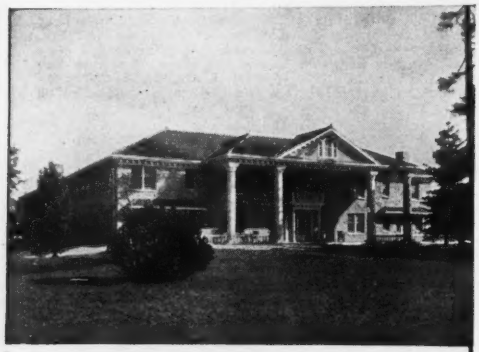

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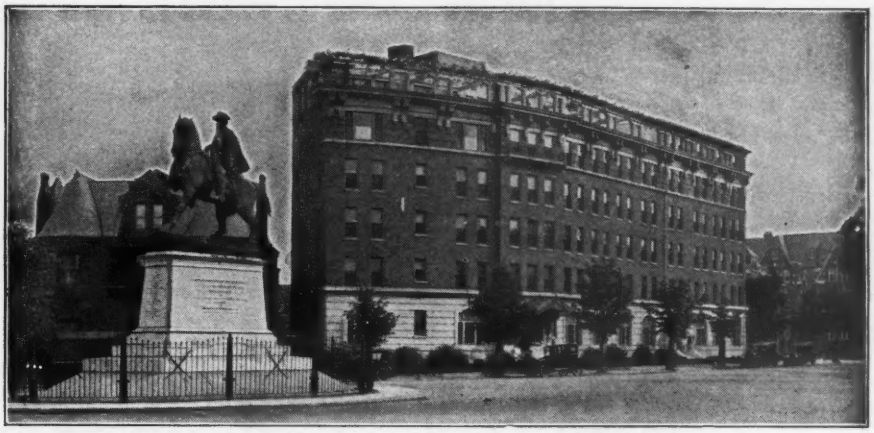

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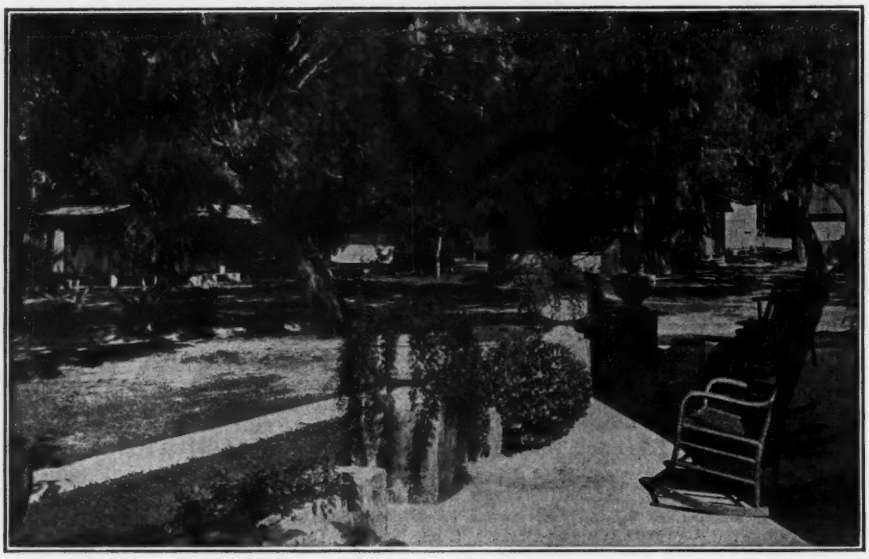

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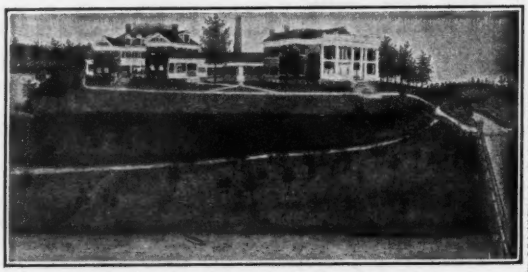

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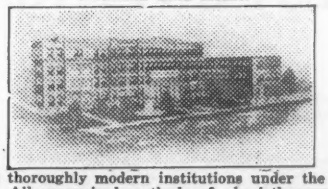

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Volume XX AUGUST 1927 Number 8

TREATMENT OF ACUTE COMMINUTED FRACTURES ABOUT THE ELBOW JOINT: REPORT OF SIXTY CASES*†

By H. EARLE CONWELL, M.D., F.A.C.S., Fairfield, Ala.

In presenting this series of sixty selected cases of acute comminuted fractures of the elbow from a group of two hundred and thirty-seven acute fractures about the elbow joint treated at the Orthopedic Clinic of the Employes' Hospital, consideration is given only to those cases in which severely traumatized soft parts and comminution of the bone were encountered, making the routine treatment by the Jones Method such as is usually practiced impossible. Such cases we regard as unsafe to treat outside of a hospital, because frequent daily inspections are necessary if good results are to be secured. In other words, this is the type of case in which the full standard flexion treatment would completely obstruct circulation, and in which treatment of the injury to the soft parts is necessary.

The age of the patients in this group varies from two to sixty-five years. Eight cases were between two and seven years; nineteen between eight and sixteen years; eighteen between seventeen and twenty-six years; eight between twenty-seven and thirty-six years; four between thirty-seven and fifty years; three were over fifty years. There were forty-three males and seventeen females, of which thirty-five were white and twenty-five colored. Forty-one were civilian cases and nineteen industrial accidents. The average time of treatment in the hospital was thirty-two days. For convenience of listing, degree of soft structure injury was measured as 1, 2, 3 or 4 plus. The average involvement in this series was 3.1 plus. Every case in the series showed either comminution of a single bone or the involvement of two or more bones, with forty-eight simple fractures and twelve compound fractures. There were thirty-five left and twenty-five right elbows.

Only the lower end of the humerus was involved in forty-three cases; only the radius in two cases; only the olecranon in one case; the humerus and olecranon in five cases; the olecranon and radius in five cases; the radius and humerus in two cases; the radius and olecranon in two cases.

A study of end results shows that ten out of the nineteen industrial injuries had excellent results and returned to their original work; four had fair results and were able to return to their original work; three had almost complete ankylosis of the elbow; and two had fifteen degrees of flexion from a right angle. The average loss of time for these patients was four to five months from heavy duty, and usually three to four months from light duty. All civilians resumed their former occupations. Of the forty-five civilian cases, thirty-five have excellent results, four fair results and two have almost complete ankylosis at the elbow. It was especially noted that civilians returned to their regular occupations with much less loss of time than the industrial accidents, this being attributed to the compensation law. In the series there was no case of Volkmann's paralysis and one case of myositis ossificans.

But two open reductions were done on the simple fractures in this series, and they were on patients of thirty and thirty-four years of age. It has been our rule to resort to open reduction only after the failure of repeated efforts to secure reduction and fixation by the closed method. No removal of the radial head was done, possibly because the majority of cases in which injury of the head of the radius occurred were under sixteen years of

*Read before Section on Bone and Joint Surgery, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

†From the Orthopedic Clinic, Employes' Hospital, Tennessee Coal, Iron and Railroad Company, Fairfield, Alabama.

age. Results obtained were noticeably superior in this class of patients, with an average of only eighteen days in bed, as against twenty-four days in bed for those over sixteen years.

An interesting fact regarding the Wassermann test in this series was that with fifteen positive reactions, blood having been taken within a few hours following injury, twelve were negative a few days later.[3]

The treatment used in every case is as follows: each case is treated as an emergency and, regardless of the time of arrival at the hospital, imme-

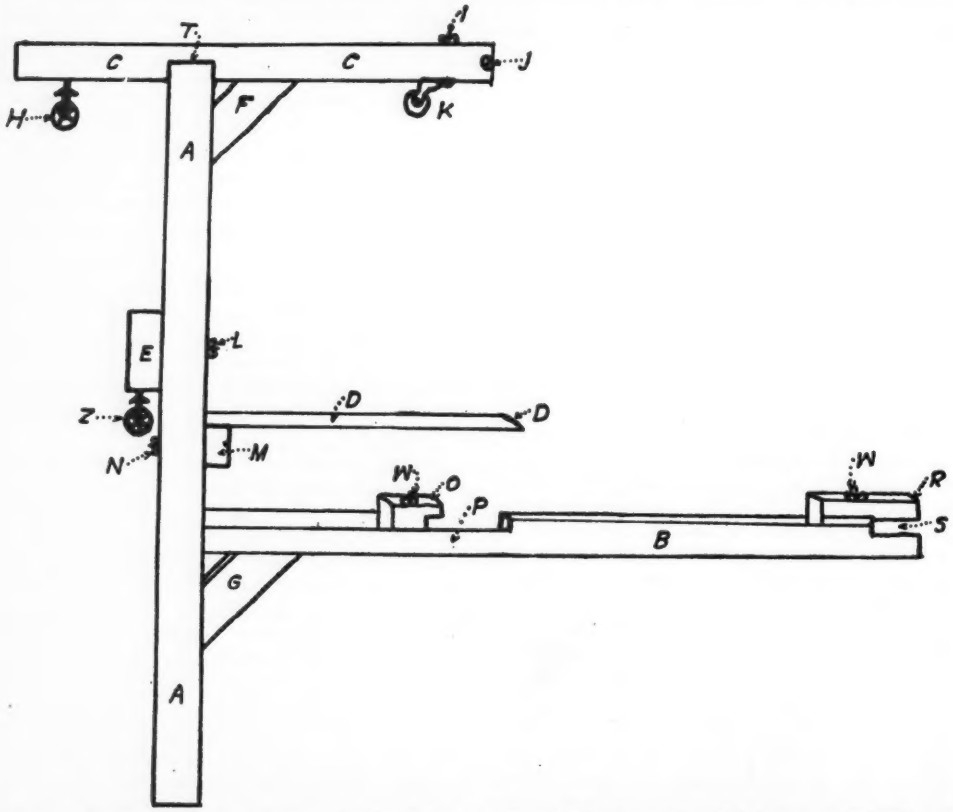


Fig. 1.—Author's abduction frame. Besides being used for fractures about the elbow joint, this frame is used for clavicle fractures, any fracture about the shoulder, fracture of the shaft of the humerus and fractures of the forearm.

Any amount of external rotation at shoulder joint can be accomplished when treating the upper humeral fracture by the addition of a board at a right angle to board D. This board is for the forearm to rest on, traction in these cases on the forearm not being necessary.

A, B and C show pieces 1.5x3.5 in. in width and thickness. A is the upright piece and is 55 inches long. B shows the piece that extends underneath bed and holds frame to bed and is 58 in. long. C is the cross-piece at the top, which holds up the forearm, and is 47 in. long. D is .75x3.5 in. and 33 in. long. This is for the arm to rest upon and can be slipped up very easily on board A in the notch which is seen as Y in *Figs. 2 and 4*. E is the main block which holds the pulley Z for the main traction. This block also slips up through the slot Y as in *Figs. 2 and 4*. The pulley Z is a 2.5 in. screw pulley. K shows the pulley which slips along a slot in board C, which is shown in *Fig. 2* as T. This allows any amount of flexion or extension which is desired at elbow. Pulley H holds the extension from the pulley K. R, S, O and P show the attachments of the board B to the railings on bed. Notches P and S are made long to allow for any amount of abduction or adduction of the frame for the arm at the shoulder. The boards G and F are supports for B and C. J shows the screw which holds the divided slits T and C together. L, N, W and I are winged nuts with screw bolts which hold corresponding blocks together on frame.

This frame can be made by any carpenter, and is easily assembled and adjusted.

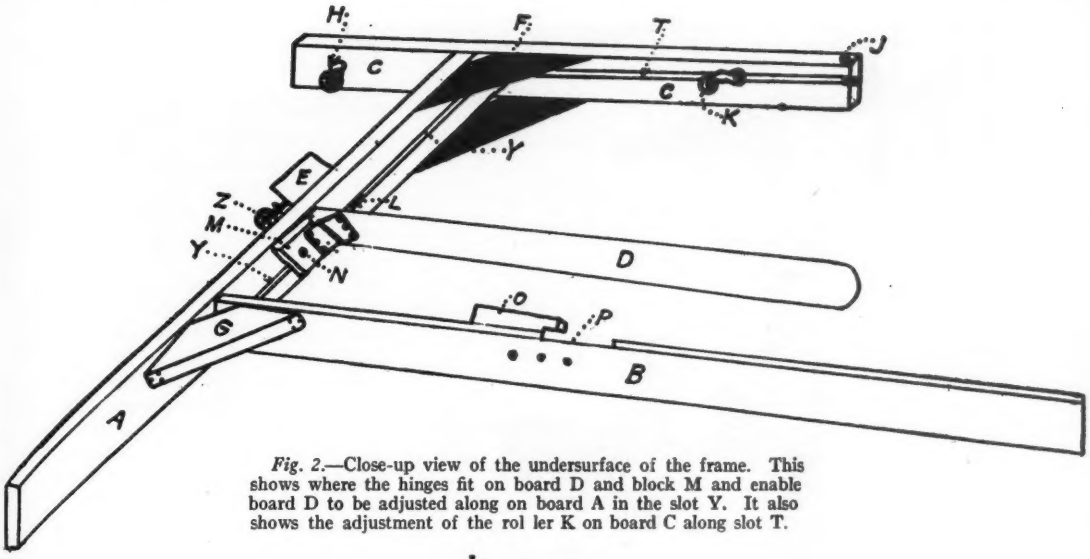


Fig. 2.—Close-up view of the undersurface of the frame. This shows where the hinges fit on board D and block M and enable board D to be adjusted along on board A in the slot Y. It also shows the adjustment of the rol ler K on board C along slot T.

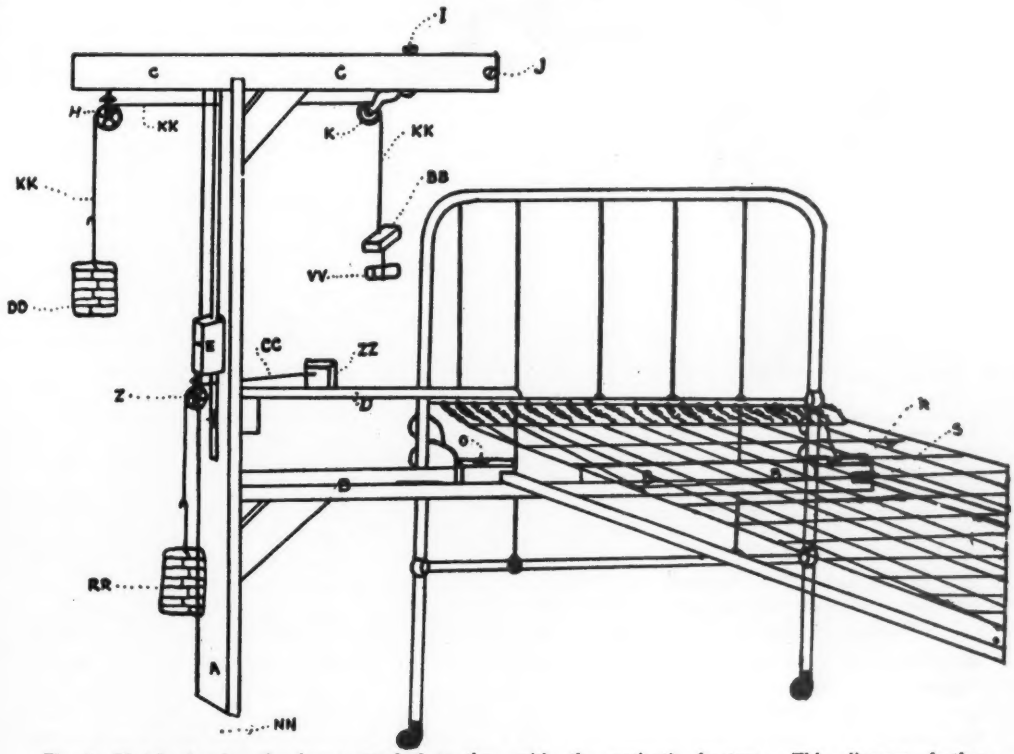


Fig. 3.—Sketch showing the frame attached to the bed. Note NN, which shows where the frame clears the floor and enables the bed to be moved about without changing the frame or without any interference with the patient's fracture. This diagram further shows the pull on arm and elbow ZZ and CC along on the board D and also shows the pull on forearm BB and KK.

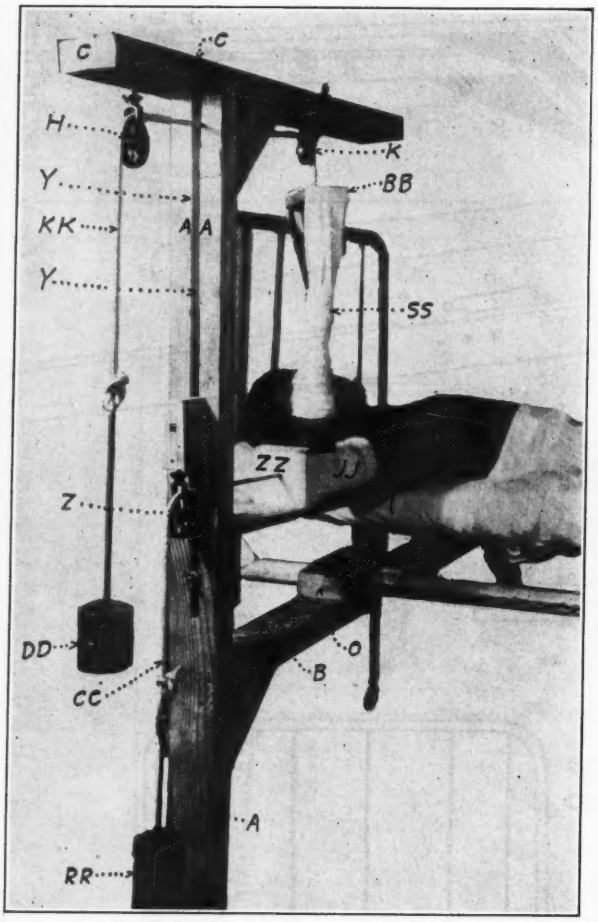
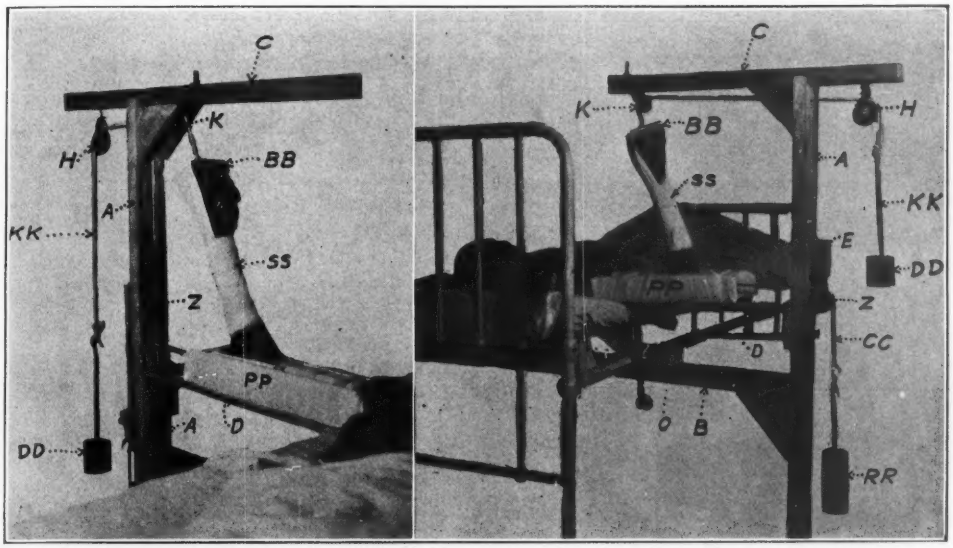


Fig. 4.—Close-up photograph showing the main pull on the forearm and arm and also the slot Y in the board A. JJ shows the adhesive applied directly to the arm before the lateral board splints have been applied. This photograph also shows application of adhesive to the forearm SS. The weights applied to the forearm DD and arm RR vary according to the size of the patient and, of course, the amount of traction needed.

diate attention is given. We have felt that swelling about the elbow is in no way a contra-indication to immediate attempt at reduction and that our functional results are in direct ratio to the elapsed time between the accident and the reduction of the fracture. Immediately following the taking of a careful history of the injury and the making of a physical examination, radiographic examination is carried out, with very gentle inspection and palpation of the injured elbow. Immediate manipulation and reduction is carried out under general anesthesia, if conditions permit, and adhesive (as shown in Figure 4 "JJ" and "SS") for traction on the arm and forearm is then applied and the operator holds the arm and forearm in place and accompanies the patient to the ward, where traction is applied to the forearm and the arm with the aid of the author's abduction frame (Figures 1-2-3). The traction to the arm and the elbow has a definite tendency to press gently on each side of the elbow, aiding approximation of fragments, and with the assistance of two lateral splints (as shown in Figure 5A-5B "PP") further fixation of the fragments can be secured. The amount of traction on the arm used is dependent on the size and age of the patient, from four to twelve pounds covering this range. Less weight is used on the forearm, the object being to place sufficient traction barely to allow the elbow to touch the board where the arm rests. The abducted position of the arm at the shoulder prevents any rotation of the lower fragment of the humerus on the upper fragment. The frame and traction make dressings, treatment and frequent inspection of the elbow very easy, and allow for adjustments and active and passive motion as well. The amount of flexion allowed at the elbow in the beginning varies with the type of fracture and the amount of swelling. (In the majority of cases in this series the swelling about the elbow was so great that it was impossible to secure more than right angle flexion without obstructing circulation.) Flexion is gradually increased from day to day, as the swelling disappears, in all fractures until almost the full amount of flexion is obtained, usually in five to six days following injury. Extension is usually accomplished within ten or twelve days following injury, with daily manipulation just to the point of pain to the patient. Active motion is



Figs. 5-A and 5-B.—Photographs showing (A) extension and (B) flexion at elbow. It also shows the application of boards PP to allow lateral pressure on the fragments at the elbow. These boards with traction on adhesive JJ cause a lateral pressure and hold the fragments in place.

Figs. 7-A and 7-B (Case 2).—C. J., a colored boy, age 12 years, was injured December 10, 1925, and admitted to Employes' Hospital on same date. A diagnosis was made of T-shaped compound fracture of lower end of left humerus, extending into the elbow joint separating the condyles. He was injured by falling on his arm while playing at school. The wound was cleaned, reduction carried out, ether-Dakin technic used, wound closed, and the traction method applied. He was treated in the hospital until January 5, 1926, and discharged with the arm in a sling and treated at the Out Clinic. Radiographic and physical examinations on June 30, 1926 (*Figure 7-B*) showed excellent union and position and perfect functional results.

Figs. 6-A and 6-B (Case 1).—S. R. Y., a colored man, age 39, was injured November 11, 1922, and admitted to the Employes' Hospital on the same date. A diagnosis was made of compound comminuted fractures of the lower end of the left humerus and the olecranon process of ulna. He was injured by an air hammer which struck the elbow several times. The fractures involved the elbow joint. A debridement was done, and reduction was carried out as described. He was treated in the abduction frame and was discharged from the hospital December 26, 1922, improving and with his arm in a sling. He was observed at frequent intervals at the Out Clinic until December, 1923. Radiographic examination December, 1923, (*Figure 6-B*) showed that he had good union and position, and physical examination showed good functional results.

allowed as early as the patient can be persuaded to carry it out.

On the compound wound from without in, where soft structures were severely mutilated, debridement was done under a technic of ether-Dakin, which has been used with success, as follows: the wound and surrounding structures are cleansed and ether is used copiously in the wound and around the edges; and in the course of operation the wound is saturated and washed out continuously with Dakin solution, no iodin or alcohol being used. Following reduction of the fracture, all wounds are closed and the Dakin tube is applied over the wound and Dakin solution is used in the tube every two hours. On the compound wounds from within out, the wound is merely cleaned, ether-Dakin technic used, reduction of the fracture is carried out and the wound is then sutured, provided it is certain that no foreign material is present. No debridement is done on the gunshot wounds unless there is a severe mutilation of the soft parts. Cauterization to the gunshot wounds, of the wounds of entrance and exit, is always done. Anti-tetanic serum is given in every case where an open wound is present.

The ambulatory dressing described by Eliason[4] has been used in a number of cases, but we believe that at this stage of convalescence the dressing of Siris[5] is perhaps superior, the ambulatory supports being used for only a week or ten days. Following the removal of supports, hot baths, massage, active and passive motion, as well as diathermy, are employed, the case being kept under frequent observation. Every effort is made to impress on the patient the fact

that his functional results are also partially dependent on his cooperation and efforts.

The importance of frequent daily attentions and applications of radiant light while in the hospital cannot be emphasized too much in this type of cases.

The convalescence period is also a very important one. The same surgeon who treated a certain case in the hospital should also follow this case in the out clinic until it is cured. Familiarity with the pathology of the injured elbow is very important and no two surgeons at different periods of a patient's convalescence can fully understand that individual case.

No forced motion should ever be carried out during the post-hospital period of convalescence. Let the patient do all the motion, but force the patient. Take care always to prevent undue tenderness or pain. If any tenderness or pain should occur, allow the limb to rest as regards motion, but always keep up hot baths, radiant light and other forms of physiotherapy.

CONCLUSIONS

(1) The treatment of soft structure injuries is as important as the treatment of bone and joint injuries.

(2) Perfect anatomical position is not always essential for perfect functional results.

(3) Every case of this type should be considered as an emergency for hospitalization, and reduction under general anesthesia should be immediately accomplished if the condition of the patient warrants.

(4) Excellent results have been obtained in the severely traumatized elbows which were treated with right angle abduction frame, with patient in bed and traction applied with the lateral board splints and frequent daily attention to soft structures, with active and passive motion to arm and elbow.

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Discussion follows paper of Dr. Shipley, page 601.

FRACTURES OF THE UPPER THIRD OF THE ULNA*

By ISIDORE COHN, M.D., F.A.C.S.,**
New Orleans, La.

Under this title are included fractures of the olecranon, coronoid, and upper third of the shaft of the ulna, either alone or associated with fracture or dislocation of the head of the radius, and fractures of the upper one-third of both bones of the forearm.

It is impressive and disappointing to scan the literature, particularly the systems of surgery and texts on neurology, for information relative to treatment of particular portions of the ulna. Much valuable information is contained in journal literature, but obscured under titles which many of us would overlook in our search for facts relative to fractures of the upper third of the ulna. Much information with regard to fractures of the coronoid may be found when searching the literature relative to anterior dislocations of the elbow. Information relative to fractures of the upper third of the ulna associated with fracture or dislocation of the radial head is obscured by such a title as "Musculo-Spiral Paralysis Due to Dislocation of the Head of the Radius." It is only from this type of literature that we can find the information.

It is difficult to understand the fact that not only the ulna but other bones are discussed as a whole in many standard texts. In the instance of the ulna, attention is given to the olecranon, but other segments are but scantily mentioned.

In order to avoid a hasty contradiction from the defendants of these texts I shall quote from some of them.

Wilson and Cochrane, "Fractures of the Shaft of the Ulna:" "Manipulative reduction is practically always indicated for the correction of deformity. If there is considerable displacement of the bones toward the radius, the reduction should be performed with the forearm completely pronated. The elbow should usually be fixed in right-angled flexion."

Groves, "Fractures of Both Bones of the Forearm," 1922: "Before describing the treatment specially indicated for various types of fractures, it may be well to emphasize certain important principles. These are the necessity for a bent elbow, a supinated hand, and a dorsiflexed wrist. The wisdom of keeping the elbow

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

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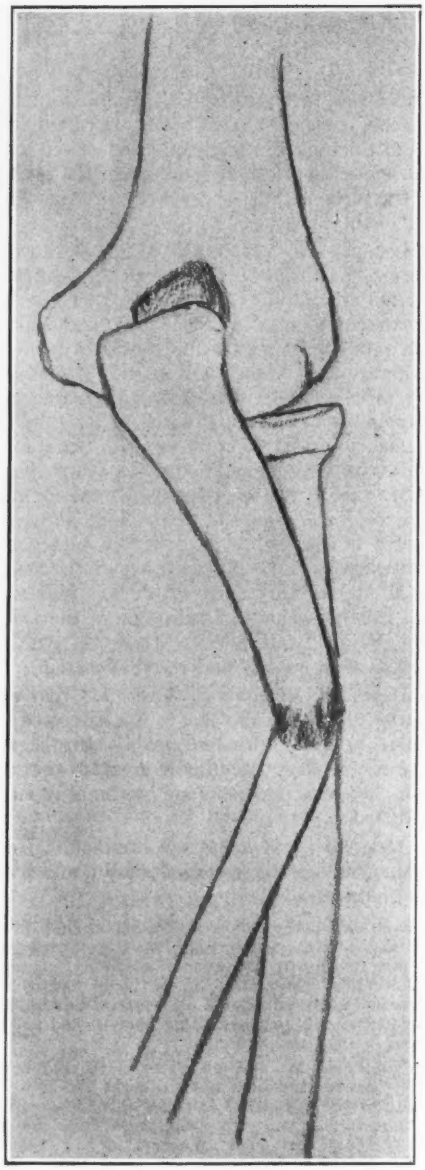

Fig. 1
Pendulum swing.

Fig. 3
Mrs. Sciar. End result.

Fig. 2
Mrs. Sciar

bent does not require much argument, as this is the only convenient position in which the arm can be placed.

"Fractures of the shaft of the ulna without injury to the radius very seldom require operative treatment. Simple splinting with or without traction serves to secure correct alignment of this bone and the intact radius will prevent any overlapping.

"It is always worth while to repair fractures of the radius with the most meticulous accuracy, especially in regard to the preservation of its curve. On the other hand, fractures of the shaft of the ulna are of very little importance."

It is a matter of much satisfaction to find in the 1926, or Tenth Edition of Scudder's "Fractures," quotations from the author's previous contribution to this subject.

Scudder: "Fractures of the shaft of the ulna should be treated so as to restore the shaft of the ulna to its anatomy. The ulna is the important bone of the forearm.

"In fractures through the upper third of the ulna shaft the upper fragment is slightly flexed by the action of the brachialis anticus and swings away from the midline, diminishing the carrying angle. Consequently the relations of the sigmoid cavity are changed, so that if union occurs in this displaced position of the upper fragment, flexion of the elbow will be materially impaired" (Cohn).

As early as 1854, Malgaigne suspected every ulna shaft fracture of being associated with anterior dislocation of the head of the radius.

In 1912, Ashhurst reported twenty-three isolated fractures of the ulna from his service, three associated with fracture or dislocation of the head of the radius.

DeWitt Stetton (1908) collected one hundred and nineteen such combined cases and reviewed the literature of the association of musculo-spiral paralysis with dislocation of the head of the radius when combined with fracture of the ulna shaft. The first report of this complication was made by Grenier in 1878. Since his reference reports have been made by many observers. In spite of authentic cases Stetton laments the fact that standard surgical and neurological volumes contain no mention of the association of these lesions. The author reproduced this complication experimentally on cadavers. Aside from the value of his contribution from the experimental standpoint, a practical point of great value is contained in his conclusion: "Flexion of the elbow relaxes the tension on the nerves." I think that this may be taken as an additional anatomic reason for the conclusion reached by Stetton: "Flexion of the elbow is the position of election in the handling of these cases."

For more than fifteen years I have been interested in injuries about the elbow. One cannot study this joint without appreciating the importance of ulna fractures.

There are certain anatomical principles which should guide us: (1) we should realize the importance of knowledge of muscle origin, inser-

Fig. 4
Mrs. Sciar. End result.

tion and action; (2) when a bone is fractured between the origin and insertion of a given group of muscles, this group is rendered inert so far as the entire limb is concerned; (3) the unopposed contraction of the remaining groups of muscles produces deformity; (4) improvement in results may be expected from treatment according to fundamental principles as opposed to the use of preconceived plans.

In 1923, in a paper on "Ankylosis of the Elbow," I made certain observations which I should like to repeat:

"Traumatic ankylosis of the elbow is not an uncommon sequel of fractures about the elbow. There are certain type groups that will regularly result in partial or complete ankylosis unless definite effort is made from the onset to avoid disability." One of the groups includes fractures of the ulna, particularly of the upper third.

"(1) Reduction of the deformity in fractures of the upper third of the ulna is essential. (2) When the deformity is reduced, no limitation of motion results. (3) If it is not possible to maintain reduction, open operation is advisable."

In 1925 practically the same statements as were contained in the 1923 article were reiterated with this addition:

"Fracture of the upper third of the ulna had best be treated by hyperflexion of the elbow."

It is generally appreciated that a maintenance of the normal carrying angle is essential for a perfectly functioning elbow. Anything which will permit greater freedom of the ulna in a lateral direction alters the carrying angle.

In fractures of the upper third of the ulna there is a definite pendulum swing of the upper fragments to the radial side. This is, in part, due to the contraction of the anconeus and supinator brevis which originate from the external condyle and are attached to the upper fragment. Their contraction results in a radial deviation of the ulna. The upper fragment is flexed by the brachialis anticus and the biceps. Thus we have a flexion and radial deviation of the upper fragment, which stretches the internal lateral ligament of the elbow. The deviation thus described alters the relationship of the sigmoid cavity to the articular surface of the humerus, thus limiting motion of the joint.

It is, therefore, easy to appreciate that if we would have a normal functioning elbow the pendulum action, thus described, must be overcome. If there is one place where an anatomic restoration of the alignment is desirable, this is the place. If, therefore, one cannot overcome the deformity by conservative means, one must resort to operation.

It is true that many cases, after a time, with persistent personal care, obtain good functional results, even though x-rays indicate a persistence of vicious union. To illustrate this point, the following cases, Mrs. S. and Mrs. L., are introduced:

Mrs. S., age 28, had a fracture of the radius and ulna junction of the middle and lower third. She fell down a flight of stairs August 17, 1924, and was seen three hours after the accident.

Angulation of the forearm, with complete loss of function, and pain resulted. Under anesthetic, the arm was manipulated and an attempt was made to reduce the deformity. Molded plaster splints at right angle were used, with the forearm completely supinated.

By September 9, 1924, there was no deformity, and very little swelling.

During the month of October she began to do housework against our advice, and developed a very marked angulation of the forearm. During January, 1925, we were able to persuade her to submit to some attempt at molding the forearm. There was a marked cubitus varus, atrophy of the muscles of the hand and forearm, and limitation of flexion of the elbow. We persisted in our efforts with heat, molding and resistive exercise.

X-rays taken in September, 1926, indicated that there was no limitation of motion of the elbow. The carrying angle had returned to normal. Her grip was not impaired, and there was no evidence of deformity. Motion pictures will illustrate her present condition.

Mrs. L. had an impacted fracture of the base of the left radius, a fracture of the styloid process of the ulna, fracture of the head of the radius with marked forward displacement, and fracture of the ulna junction of the middle and upper third of the shaft. The

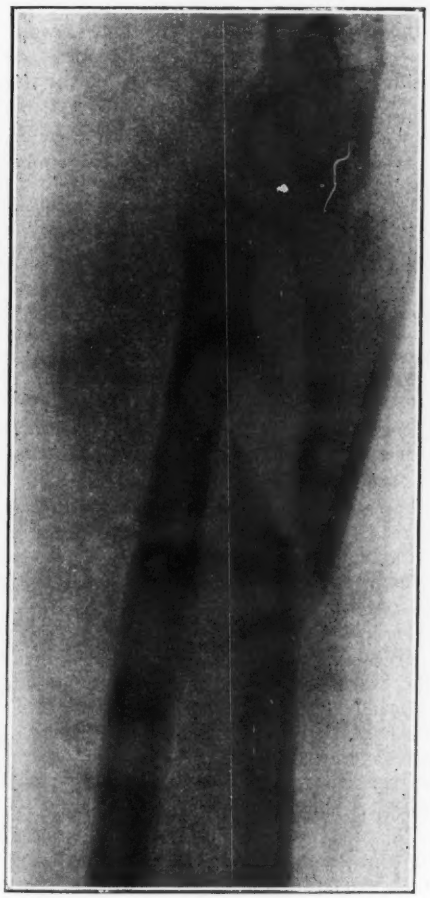

Fig. 5
Mrs. L. Immediately after accident. Associated fracture, base of radius.

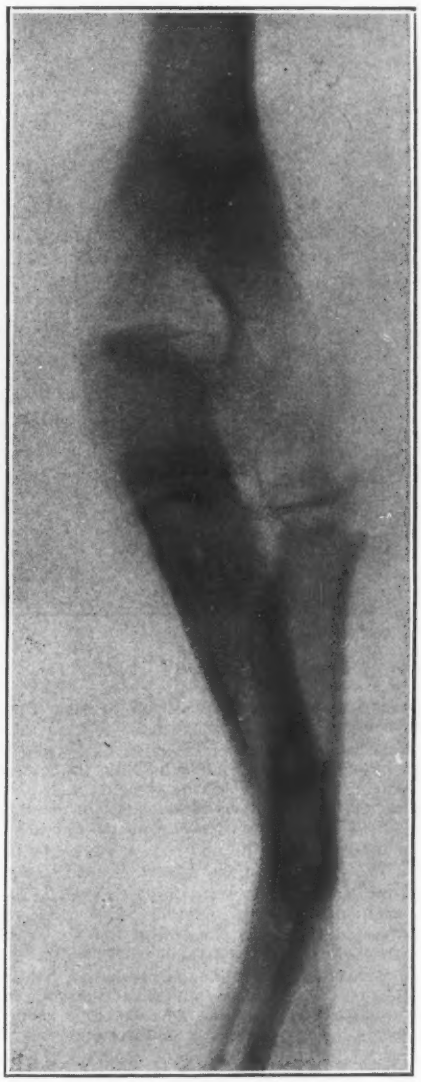

Fig. 6
Oct. 20, 1924. Before manipulation. (Mrs. L.)

Fig. 7
Mrs. L.—End result.

accident was the result of an attempt to signal a passing automobile.

Immediate treatment was rendered by Drs. Hatch and Isidore Cohn. Two months after the accident a deformity persisted, as will be seen in the x-ray pictures, which show a very definite pendulum swing of the ulna and fracture of the head of the radius.

An attempt was made, under anesthesia on September 22, 1924, to manipulate the forearm in order to mold it.

X-ray pictures taken after this show improvement in the position of the ulna fragment. There were certain underlying reasons why this patient was not submitted to operation, either primarily or subsequently.

At the present time she has a perfect functioning wrist, very little, if any, noticeable deformity in the forearm, and no limitation whatsoever in motion of the elbow. This will be seen in the motion pictures.

These cases indicate that efforts should be continued at times, and that massage, resistive exercise and heat, in one of the many forms, plus molding, may result favorably. Other cases require operation. The object of operation is, of course, to obtain as nearly as possible perfect alignment and physiological function.

Under certain circumstances which need not be emphasized, operation is always contra-indicated (when facilities for the work are lacking). On this point the group, under the guidance of Dr. Scudder, which published its results in the *Archives of Surgery,* stated:

"Operative treatment is indicated when a satisfactory reduction cannot be obtained and maintained by non-operative methods, provided there is no contra-indication, and when the expected result of the open method is sufficiently better than that of the closed to justify the additional risk."

When operation is undertaken the method of approach is important. The classic work of Professor J. E. Thompson relative to exposure of the long bones emphasizes all of the important points to be utilized. I quote extensively from the elaborate paper of Dr. Thompson:

"In exposing the long bones the following principles must be scrupulously observed:

"(1) As far as possible we should try to avoid deep wounds where shallow ones will suffice.

"(2) We should preserve all nerves, both sensory and motor.

"(3) As far as possible the approach should be between the muscles.

"(4) It is always wise, other things being equal, to choose a route remote from the blood vessels.

"Further, it must be borne in mind that any injury to the nutrient arteries of the bones must be avoided."

Since the publication of this masterpiece I have attempted to follow, as nearly as possible, his teaching.

The incision, which we propose for the exposure of the upper end of the shaft of the ulna, and at the same time the elbow, is largely based on my interpretation of the fundamental principles expressed in this work.

The method of approach consists of two separate incisions. The first is a linear and the other a semi-circular incision which extends from one condyle to the other. The relation of the two is such that the linear incision meets the semi-circular at its pole. When only the skin has been incised, the outline resembles a flagstaff on a mound.

The position of the forearm is important. The elbow is flexed and the forearm is midway between pronation and supination. This permits approach to the shaft of the ulna along the posterior ridge between the flexor profunda digitorium, extensor carpi ulnaris, and anconeus.

The shaft of the ulna is thus reached without injury to the muscles.

The semi-circular flap of skin and superficial fascia is reflected. The muscles on either side of the linear incision are reflected and with them the radial and ulna nerves are retracted out of harm's way. The upper fragment, which consists of the olecranon and the attached triceps, is reflected slightly. The joint surface of the lower end of the humerus is then exposed, and with a retractor introduced, the vessels in front of the elbow are lifted up, permitting access to the front of the joint for the purpose of removing fragments of the head of the radius or of the coronoid. Retraction in this way avoids injury to the vessels which lie in front.

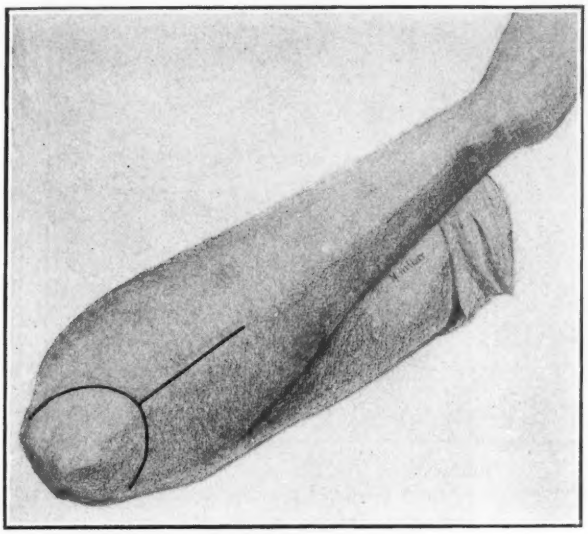

Fig. 8
Incision.

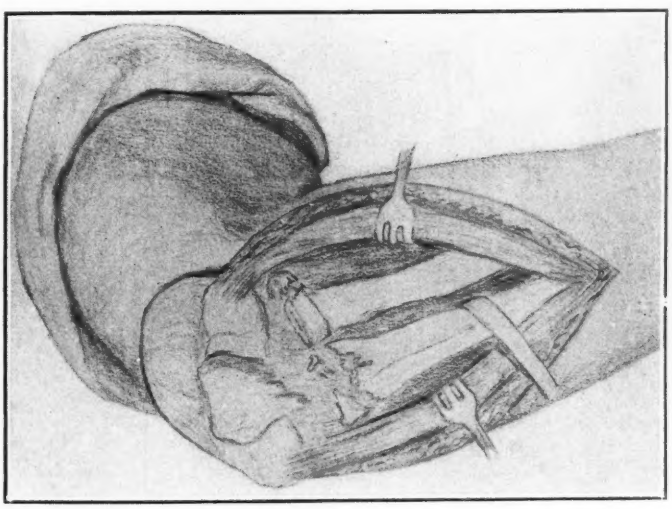

Fig. 9
Incision for exposure fracture upper one-third ulna and elbow joint.

Other details relative to the particular method of approximating the fragment of the two ends of the fractured bone will be approached according to the particular habits of the operating surgeon.

Our own preference is for the avoidance of the introduction of metallic material, if possible.

The advantages of this incision are, I believe, that it permits an approach to the joint without injury to important muscles or vessels and that it is not necessary to expose the nerves as they are retracted with the muscle.

The following case illustrates the use of the above incision:

Mr. P. B., age 21, fell from a scaffold 26 feet, striking the elbow and hip. He was admitted to Touro Infirmary by Dr. Tyrone. Immediately after completing his examination, Dr. Tyrone had x-ray pictures made, and these showed a fracture of the ulna just below the olecranon, a fracture of the coronoid process, and backward displacement of the upper fragment of the ulna with comminution. Dr. Tyrone made an effort to reduce the deformity by extension of the arm. X-ray pictures taken immediately after the attempt at reduction reveal the persistence of the deformity with an upward displacement of the humerus. A fracture of the head of the radius could be seen displaced forward in the antecubital fossa.

Dr. Tyrone asked me to see the patient in consultation, and on May 22 our findings were as follows:

The entire forearm was greatly swollen, with ecchymosis about the elbow, especially over the posterior as-

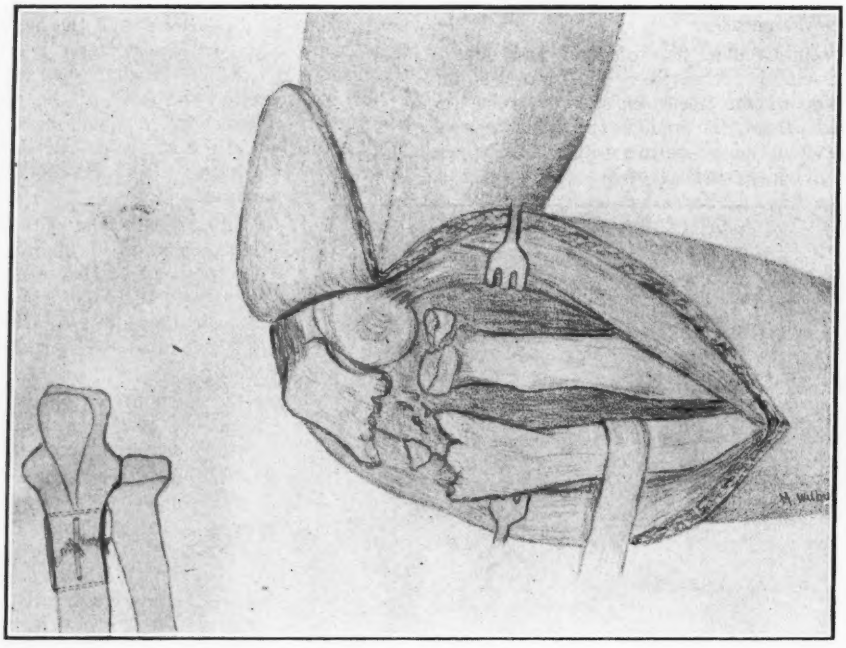

Fig. 10
Exposure of elbow and fractures of upper one-third ulna.

Fig. 11
Mr. P. B.—Fracture ulna below coronoid. Fracture head of radius.

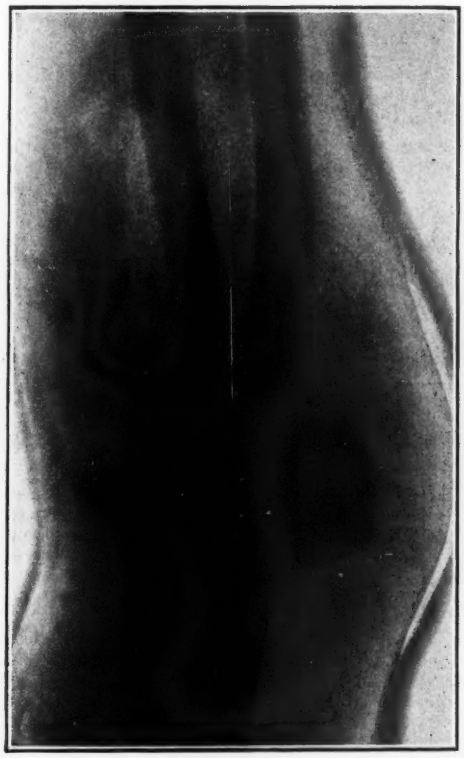

Fig. 12
P. B.—After manipulation.

pect. The forearm was pronated, and the elbow was in a position of extension in plaster splints. When the splints were removed the patient's own tendency was to flex the elbow. In this position the deformity was of such a character that a backward displacement of the elbow was evident. No attempt was made to manipulate the elbow, as x-ray pictures had already been taken, and showed several comminuted fractures of the head of the radius as well as fracture of the ulna. We advised open operation.

Operation was done May 23. Position: the forearm midway between pronation and supination and the elbow flexed about a right angle. The incision was about four inches long, beginning at the junction of the middle and upper third of the ulna, and extending upward to within an inch of the tip of the olecranon.

At this point a second incision was made which began above the external condyle, extending in a semicircular fashion, so that its pole corresponded to the upper end of the original linear incision. The end of the incision extended upward beyond the internal condyle.

The original linear incision was prolonged into the inter-muscular plane, between the flexor profundus digitorum and the brachioradialis, extensor carpi ulnaris, and anconeus. This permitted an exposure of the ulna without cutting through muscles and without injuring important structures.

The semi-circular flap, which included skin fascia, the olecranon process, and, of course, the attached triceps was retracted upward.

The joint surfaces of the lower end of the humerus were exposed, the comminuted fragments on the anterior aspect of the ulna and head of the radius were sought and removed carefully, avoiding the vessels which lay in front of them.

After clearing the joint of those particles of bone, which would have acted as foreign bodies, the shaft of the ulna was exposed for about an inch and a half, subperiosteally, and separated from the surrounding structures by a tape retractor.

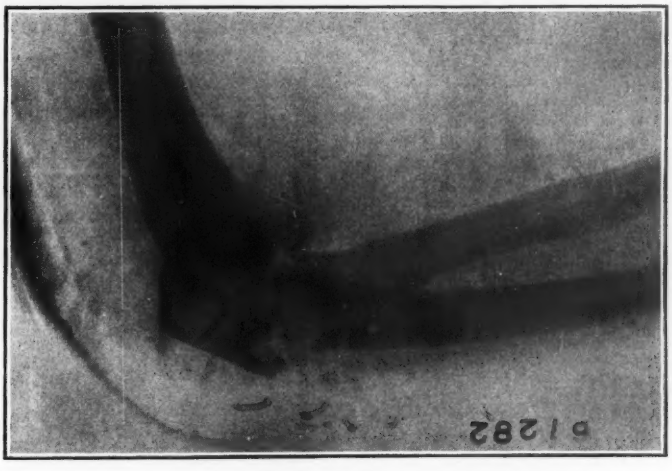

Fig. 13
P. B.—After operation.

Fig. 14
P. B.—After operation.

Two drill holes were passed through, one in the transverse axis of the ulna and the other in the antero-posterior direction.

Similar drill holes were made in the upper fragment, kangaroo tendon was passed through these drill holes, and the two ends were approximated. The position in which they seemed to remain in best approximation was about 110 degrees.

No important vessels had been injured. The muscle planes were approximated and skin sutures introduced. Dermal sutures were deep, and there were a few interrupted fine dermal sutures. Plaster molded splints were applied.

Two days after operation x-rays were taken and the following report was returned by Dr. Henderson, radiologist at Touro Infirmary: "It will be noted that the position after operation showed the restoration of the carrying angle, with the olecranon occupying the normal olecranon fossa. The antero-posterior view showed excellent apposition of the fragment."

Following the operation there was no swelling of the fingers or numbness. Apparently the patient was comfortable. There was considerable drainage from the wound but no evidence of infection.

On May 28 the wound was dressed. The forearm was swollen but not red, and the wound was uniting by primary intention. The elbow was manipulated in passive motion through an arch of 45 degrees without pain. The forearm was supinated without causing pain. The patient was discharged from the hospital on July 5. The range of motion at this time was about 60 degrees.

After this the patient was seen in the office and increasing doses of ultra-violet light were given, Alpine light being used. The swelling rapidly diminished. The range of motion increased, and the wound granulated rapidly. By July 7, 1926, he had voluntary range of motion from 50 to 60 degrees. Pronation and supination, only slightly limited, occasioned no pain.

About this time we began to use diathermy as a means of favoring absorption of the exudate in the muscle.

By August 16 he had almost complete extension and flexion of 60 degrees.

November 1 he had almost complete extension and passive flexion to 45 degrees, active well beyond a right angle. The carrying angle was not impaired.

SUMMARY

(1) The treatment of fractures should be considered with reference to the bone level, due consideration being given to muscle action.

(2) Attention in the type under consideration should be directed to radial nerve injuries.

(3) Anatomic restoration is important because of partial ankylosis, which results from deviation of the ulna from the normal plane.

(4) When surgery is indicated, the approach should avoid unnecessary damage to important structures.

1522 Aline Street.

Discussion follows paper of Dr. Shipley, page 601.

OPEN REDUCTION OF FRACTURES OF THE FOREARM*

By ARTHUR MARRIOTT SHIPLEY, M.D.,
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Most fractures of the forearm are successfully treated by manipulation and by splinting without resorting to open reduction. This is true of almost every fracture of the lower end of the radius and is usually true of fractures of one bone of the forearm, but this simpler method of reduction may fail when both the ulna and radius are broken and overriding of both bones is present. Simple reduction is not possible in unreduced Colles' fractures where considerable time has elapsed after the injury, which has allowed such firm union to take place as to make breaking up of the fragments by manipulation impossible.

Closed r e d u c t i o n sometimes fails when only one bone of the forearm is broken and where there is considerable overriding. The unbroken bone so splints the forearm as to make unlocking of the fragments difficult or impossible and occasionally where both bones of the forearm are broken and where there is considerable overriding and some torn muscle between the fragments, repeated manipulation may fail to get the bones in satisfactory position. It is a disappointing and disturbing thing to the surgeon and to the patient, or to the patient's parents, to have to anesthetize an individual repeatedly and to find after each attempt that the fragments are in an unsatisfactory position. This is especially apt to occur after fractures of both bones of the forearm. Either bone can be displaced in four ways, so that when both bones are considered there are eight different ways in which the alignment may be wrong.

In fractures of either the radius or ulna in the lower third of the forearm the pull of the pronator quadratus is apt to displace the lower fragment toward the other bone. Union in this position may limit pronation and supination. Closed reduction of such a fracture is always difficult, and sometimes impossible, because the lower fragment is too short to grasp during manipulation. This is especially true of the ulna.

Most methods of internal splinting of the bones of the forearm after open reduction are unsatisfactory because of the small size of the bones and on account of the narrow space that separates the radius from the ulna. It is essential above everything else not to interfere

Fig. 1
Fractures of both bones with angulation of the ulna and overriding of the radius.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

Fig. 2
After open reduction.

with pronation and supination, if one is to get a good result.

In former years I used the Lane plate a few times in these fractures, but have abandoned it, because the bones are small and the plate and screws are cumbersome. A lot of thickening at the site of fracture follows and in a thin forearm the mass is unsightly and, at times, uncomfortable and disturbing to the patient.

I have occasionally used wire with good results and one of my colleagues still uses wire in open reduction of small bone fractures. The use of wire entails much handling. The ends of the bones have to be exposed over a considerable distance, and I am always afraid of damaging the soft tissues so that nerves or blood vessels are injured or adhesions are formed between the different tendon sheaths in the forearm. Wire is also apt to break.

I occasionally used to make use of an intramedullary graft, but this method, which is a very satisfactory one for getting the bones in position and holding them there, is sometimes followed by delayed or non-union. The bones of the forearm, especially of children, in whom fractures of the forearm are common, are too small to permit satisfactory use of sliding inlay grafts. Bone plates are cumbersome and difficult to apply on small bones.

In most fractures of the forearm the line of

Fig. 3
Fracture of the radius in good position with overriding of the ulna.

Fig. 4
After open reduction of the ulna.

Fig. 5
Fracture of both bones with overriding of the ulna.

break is more or less transverse and very often there is considerable serration of this line as well. There is nothing new in the following method of reduction and I am reporting these cases in order again to call attention to a simple and satisfactory procedure.

In fractures of one or both bones of the forearm, where the fracture is recent and where reduction by the ordinary method has failed, an incision is made through the forearm at the point of fracture and the ends of the bones are exposed. After the skin and fascia have been incised, access to the fracture line is made by blunt dissection, using a curved Kelly forceps or a pair of Mayo scissors. When the bones are exposed, each fragment is grasped by a pair of

Fig. 6
After open reduction.

Kocher clamps and the ends are lifted up until they can be brought end to end. This produces a sharp angulation, but by firm pressure at this point, the bone can be straightened out with little difficulty. This incision is left open and an incision is made over the other bone and the same procedure repeated.

If the soft parts are gently drawn aside, both fractures may be seen, and if each is end on and in good position, the soft parts are closed and the forearm splinted. If only one bone is broken and there is considerable overriding of the fragments, much traction is occasionally necessary to bring the fragments end on, and much pressure on the bone is required to straighten it out again; but all this can be done under the eye, and when the fragments are once in position there is little tendency for them to slip out again, since the unbroken bone acts as a splint.

In unreduced Colles' fractures where partial union has already taken place and unlocking of

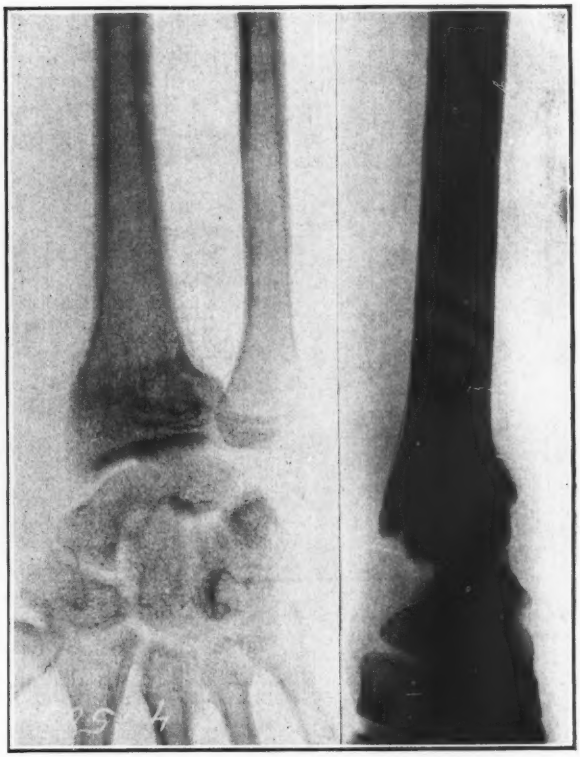

Fig. 7
Old Col'es' fracture with union without successful reduction.

Fig. 8
Old Colles' fracture with open reduction following osteotomy through the line of fracture.

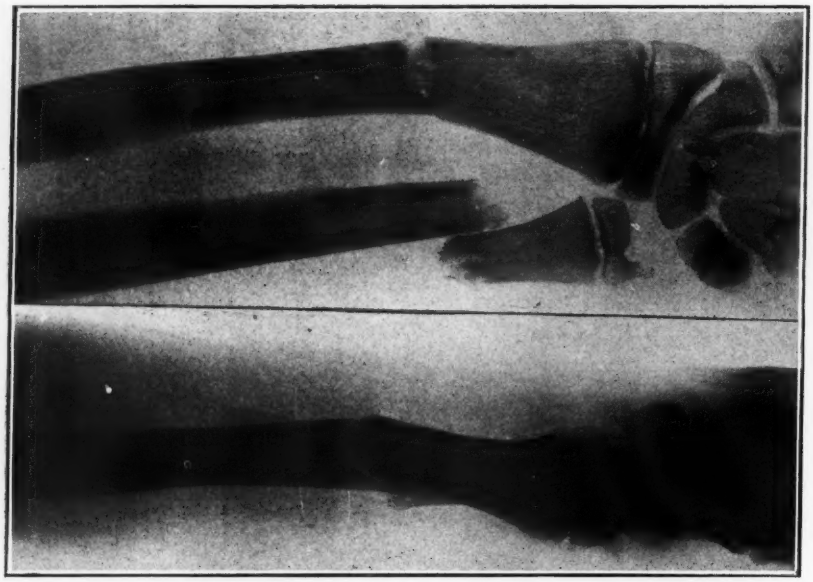

Fig. 9
Fracture of both bones with angulation of the radius and overriding of the ulna.

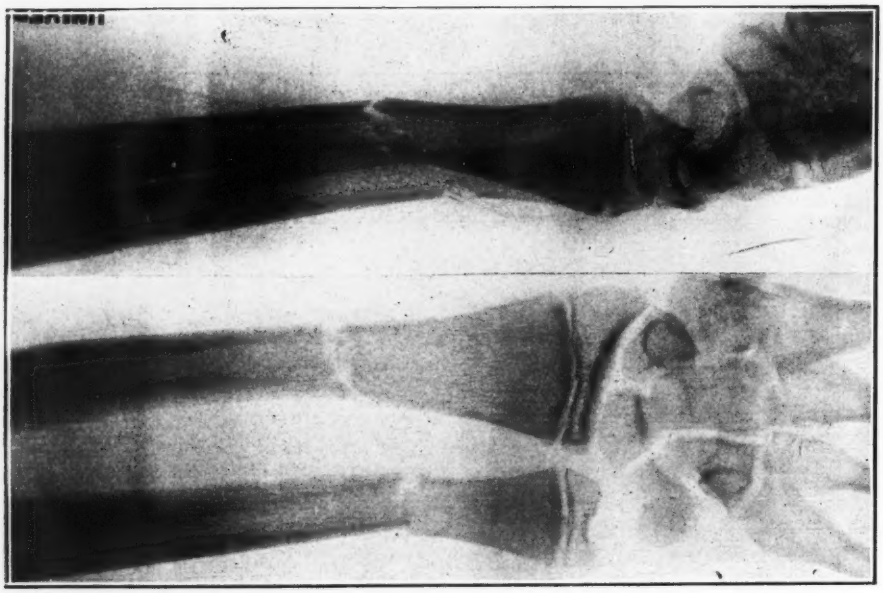

Fig. 10
Open reduction of the ulna.

the fragments is impossible, an incision is made just lateral to the radial artery, and the lower end of the radius is exposed by pulling forward the radial artery and all of the soft structures of the forearm. This leaves the radial nerve posterior to the incision.

Previous study of the x-ray is made to determine accurately the line of fracture and an osteotomy with an ordinary osteotome is done through the old fracture line. Manipulation of the fragments is then done under the eye, so that it can be seen whether or not a complete reduction of the fracture is possible. No attempt is made to fix the fracture at this time. The skin is closed and a small dressing applied, after which the ordinary manipulations for reduction of Colles' fractures are made and a splint is applied. We are in the habit of putting up the elbow, forearm and hand in plaster, with the hand sharply flexed on the forearm. This is a more satisfactory method of splinting than the ordinary application of antero-posterior wooden splints. After an old Colles' fracture has been laid open by osteotomy, the fragments are smooth and they easily slip out of position, and there is very little to lock them, so that recourse to this method of splinting has been found advantageous.

There is considerable controversy as to the wisdom of open reduction of fractures, and I believe that skill and experience will reduce the number of fractures in which this method is used. On the other hand, fractures are sometimes seen that are best treated by open reduction, and if one be careful and gentle, and if instrumental technic be followed, this method of reduction is good surgery in exceptional cases.

DISCUSSION—SYMPOSIUM ON FRACTURES

Papers of Dr. Conwell, Dr. Cohn and Dr. Shipley

Dr. Willis C. Campbell, Memphis, Tenn.—One most important factor in Dr. Conwell's treatment of fractures of the elbow is that he does not rely on traction but so soon as the condition of the injured part will permit, reduces under the fluoroscope, with anesthesia, in the operating room, and maintains the position by traction. The slides shown present fractures of the lower third of the shaft, though he also discussed comminuted fractures of the lower extremity into the joint. The latter type is quite a different problem, and not infrequently reduction of it is impossible. In such case, one must often rely upon early active motion, with the possibility of a reconstruction operation to prevent blocking at a later date, after consolidation and organization are complete. Internal fixation with early active motion may rarely be indicated, though the results are at times disappointing.

A large percentage of fractures of the lower third of the shaft of the humerus can be treated successfully by manual reduction and the application of a special ambulatory splint with fixed traction.

In children, comminution into the joint is exceedingly rare, as the extremities of the bones are more cartilaginous and the break occurs above the joint, usually as the well-known supracondylar fracture. In this type, if complete reduction is not possible, partial reduction should be accomplished at once, regardless of swelling, and a temporary right angle splint applied, with wet dressings and rest in bed. When the swelling subsides, satisfactory reduction can be accomplished and the fragments maintained in apposition by acute flexion. So soon as there is firm adhesion between the fragments, active and passive motion should be employed and, when feasible, physiotherapy. Hospitalization in this type is unnecessary and, in civil practice, impracticable. Displacement of fragments after reduction, though rare, must be prevented by observation until consolidation takes place.

In adults, the head of the radius should be widely excised when it is severely comminuted, though at times the results are not satisfactory on account of the incident injury to the soft parts and other parts of the elbow joint. If comminution is not extensive, excellent results may often be obtained by active motion alone. Dr. Conwell should be especially commended on the fact that he has had only two open reductions in this large series.

Dr. Cohn has brought to our attention a type of fracture which is not universally comprehended. On account of the complex mechanical construction of the normal elbow, as perfect apposition as possible must be secured, and perfect anatomical alignment. Otherwise, permanent inhibition of function is to be expected. I have found one linear incision, with open reduction of the ulna and manual reduction of the radius, quite sufficient. If it is not, a second linear incision is better than a V incision, which may not heal so well at the angle and is therefore slightly more prone to infection.

Manual reduction can be accomplished in a large percentage of fractures of both bones of the forearm by treating both bones as one and angulating. It is impossible to reduce one at a time, as the other will become displaced again.

In children, open reduction is unnecessary, for it has been clearly demonstrated that, if anatomical alignment is obtained, perfect function is to be expected, and that at the end of two years all evidence of even a gross overlap disappears. As was demonstrated by Dr. Cohn's slide, if one bone of the forearm in a child is reduced, a satisfactory result may be expected. In all fractures, whether children or adults, perfect reduction should be obtained, and maintained, when feasible.

Two men often approach a problem from different points of view, each securing like excellent results. There is more than one road to Rome.

Dr. R. W. Billington, Nashville, Tenn.—In any treatment of any fracture there will be differences of technic and opinion on details.

The cases described by Dr. Conwell are probably the most difficult that we have to deal with in the way of fractures about the elbow. I am sure nobody here made the mistake of thinking that he uses this method in simpler cases where the Jones position can be used. Sir Robert Jones said that practically all the ordinary

types of fractures about the elbow except fractures of the olecranon can be treated successfully in acute flexion. We all see cases of bad results where this rule was ignored.

I agree with Dr. Campbell that cases do not always require continued recumbency. Ambulatory treatment, particularly after the first three or four days, will be just as effective in some cases, and can be carried out very well by the Jones humerus traction splint or one of the abduction shoulder splints, of which there are a number with which you are familiar.

I wish to thank Dr. Cohn especially for going into the details of this fracture which, as he says, has never received special attention. I agree with him that perfect apposition, particularly perfect alignment, is as important here as it is in the fractures of the lower end of the humerus near the elbow joint. Of course, that applies to most fractures near joints, but particularly to the type of upper third ulna fractures that he has described.

The question of the open treatment of fractures still gives us some chance for argument and discussion.

Dr. Shipley showed one or two cases which I felt did not demand open operation. One near the last had good coaptation of one of the bones in the forearm, and the other was just touching the angles. In that case I think supination between mid-position and full supernation to insure the proper space between the two bones would have resulted in a perfectly good functional and cosmetic result.

We often damage our limbs, injure our patients and jeopardize our results by repeated efforts at reduction in order to get something that looks pretty in the x-ray picture to show the family or the patient. It is well for us to know just how much malposition is consistent with good function and a good cosmetic result.

Dr. E. T. Newell, Chattanooga, Tenn.—Speaking of the paper of Dr. Conwell, I went back in my records about six years to gather statistics about elbow fractures. Of forty cases we found that in 90 per cent the humerus was involved and that in 80 per cent the humerus alone was involved, which goes to show that in elbow fractures, from our viewpoint, the humerus is the chief offender.

Accurate anatomical position is very essential, because the least amount of callus that is thrown out in the joints may prevent complete flexion and extension. You may get an occasional good result where you have a faulty anatomical apposition; on the other hand, you may get a very poor functional result where you have a perfect anatomical result. On the whole, a very good result follows a good apposition, provided the after-treatment is taken up soon and is thorough.

Nothing should be more stressed in elbow fractures than the importance of early after-treatment. Heat, diathermy, passive and active motion are often most trying to the patient and surgeon. Unless we have the cooperation of the patient we do not get good results.

Elbow fractures are very serious injuries and should be treated, as Dr. Conwell has said, as an emergency. They demand immediate attention. The cases that I have had were not suitable for the Jones splint. They were so greatly swollen that I could very rarely put them up farther than a right angle, and many of them could not go to a right angle. Some typical cases in children of U-shaped backward displacement, with the lower end of the humerus impinging upon the brachial artery, demand immediate open operation.

The patient has an enormously swollen elbow, discolored, and if you traumatize the elbow furtker by manipulation, or unsuccessful reduction, you will lose an arm, or produce a Volkmann's contracture. There is a clear indication for operative interference in these cases. Our statistics show that 15 per cent of these have been operated upon. This is the highest percentage of open operation among fractures in our Clinic, except the patella and zygoma fractures.

The great value of the fluoroscopy has been stressed here. The better use you make of it, the less you will have to cut down on fractures.

In a series of one hundred and twenty-two ulna fractures that were treated in our Clinic, 85 per cent were in the lower third. Upper third fractures are very rare with us.

I found among our records two hundred and forty-four fractures of the radius and one hundred and twenty-two of the ulna. There were eleven open operations, or 3 per cent. We feel that in children, except where they have come late or where partial union with deformity has already taken place, or in adults where the fracture is in the fleshy part of the arm and there is already great swelling, open operation in fractures of the forearm is not indicated.

Where there has already been union, or where the fracture has been improperly set, or when the fracture is in a thick strong muscular adult, in the upper third with both bones overriding, it is necessary and proper to cut down upon the fracture. But in fractures of the lower third in children, or arms that are thin, it is not necessary to do open operation.

Dr. Henry G. Hill, Memphis, Tenn.—A satisfactory bloodless reduction is unquestionably desirable when it can be obtained, and no surgeon who is not thoroughly familiar with the hazards of bone surgery should undertake to reduce a fracture by the open method.

During the past few years I have seen several useless arms following an attempt openly to reduce fractures about the elbow joint. Dr. Billington has emphasized the importance of the Jones position in treating these injuries.

Marked deformity and displaced fragments, as a rule, are followed by rapid and profuse swelling. Early and satisfactory bloodless reduction is followed by a minimum amount of pain and swelling. In some two hundred cases of simple fractures about the elbow joint that I have treated, all have recovered with good functional arms. There has been no case with marked limitation of motion. Eighty-five per cent of my cases have been children. Statistics quoted by Dr. Newell of the various types are about the same as mine, 70 to 75 per cent being fractures of the lower end of the humerus.

Open reduction is indicated in a large majority of cases when there is a detached free fragment within the joint blocking motion. It is indicated in fractures of the head of the radius and in fractures of the olecranon when the fragment is detached and displaced. Practically all other types can be treated successfully in a vast majority of cases, when seen early, by the bloodless method.

Dr. J. W. Holland, Baltimore, Md.—I wish to refer to two cases of elbow fractures of a type which has not been mentioned today and, so far as I know, has not

been mentioned in the literature on elbow injuries. One occurred in a child twelve years old, the other in a child of seventeen.

Both cases had suffered dislocation of the elbow, associated with fracture of the internal epicondyle. In both cases the internal epicondyle with its attached muscles had been sucked into the joint and incarcerated between the trochlea of the humerus and the greater sigmoid cavity of the ulna. The condition could not be diagnosed without the aid of the x-ray.

I wish to call especial attention to a serious nerve complication which existed in both cases. The cases were treated by open reduction at operation and in both cases the ulnar nerve was found to be completely severed at the point where it passes between the olecranon and the internal epicondyle. Immediate suture of the nerve and replacement and fixation of the epicondyle were followed by complete restoration of function in from six to eight months in both cases.

Dr. R. L. Diveley, Kansas City, Mo.—In handling fractures about the elbow, as well as other fractures of the body, we should remember that we are not only treating a broken bone, but are dealing with other injured structures, nerves, blood vessels, muscles and ligaments. Nerve injury associated with fracture occurs very much more often than it is diagnosed, especially around the compact structures of the elbow.

The nerves about the elbow may be injured in three ways: first, the nerve may be injured at the time of fracture by the bone ends or during the period of manipulation by direct contact with the fragments, or it may be pinched between the two fragments. Second, hemorrhage may occur within the sheath with resulting scar tissue formation in the sheath. Third, the nerve may be compressed by scar tissue, this being a delayed nerve injury which may come on many months after the fracture.

Delay after nerve injury as noted adds to the destruction of the nerve fibers. As soon as definite injury is found, the nerve should be exposed and repaired.

Dr. E. G. Brackett, Boston, Mass.—The treatment of this group of fractures, like the treatment of all joint fractures by traction, takes time and persistent care, but if reposition and retention of the fragments is satisfactorily obtained without resorting to open methods, we should all agree as to the wisdom of the choice. The question of open operation in these fractures, when they are first seen, is always to be considered, and it is a matter of whether one can or cannot by manipulation both get and hold the fragments in their proper position. This is the first object, and when it can be accomplished by the closed method, surgeons should agree that preference be given to this procedure. If, on the other hand, reposition, and particularly retention of the fragments in position, is not possible by the closed methods of treatment, one should certainly not hesitate to open, in order to be sure of a control which is secure and permanent.

Dr. Conwell has emphasized again, and this cannot be emphasized too strongly, the need of early motion in all fractures that are in or near the joint, and he has called attention not only to the need, but also to the safety, of this procedure. All who have had at times to treat the old results of fractures, in which motion was not given, in which attention to the nutrition was neglected, and which have healed in good position, but with stiffened joints and atrophied muscles, have been impressed with the need to direct care toward the preservation of nutrition, and the early return of function. This is true of all fractures, but particularly true of fractures which are near or in the joint. Dr. Conwell has made excellent use of unusual opportunities in a fully-equipped hospital, with abundant material to carry on his observations and experiments in this form of treatment.

Attention paid to the after-care, along with the early protection of the joint, and the measures taken to preserve the nutrition and motion, are shown in the functional results. It is necessary, in the carrying out of therapy for the preservation of nutrition and of motion, to exercise a great deal of care, both in regard to the amount of motion and of physiotherapy given, as well as care to prevent disturbing the fragments. It is quite possible that this motion and massage be given early with safety, but it is also true that it may be given too vigorously and not wisely, to the definite detriment of the injured parts. The after-care requires quite as much intelligent thought as the early surgical attention to the fracture.

Dr. Conwell (closing).—If the elbow had been placed in the ordinary Jones position in the majority of these cases and the patient allowed to go home, complete ankylosis would have developed, as well as disastrous results to the circulation and limb. In those cases where the fracture appeared not greatly comminuted, soft structures were markedly injured, and this condition was more severe by far than if greater bone injury existed.

Every case was given an anesthetic, ether in forty cases, nitrous oxid in eighteen and local anesthetic (novocain) in two. Ether was given to children and colored patients, nitrous oxid to white adults and the local anesthetics to two white adults, who were over fifty years of age and who had severe bronchitis. The local anesthetics were successfully used. If proper reduction is to be obtained, all cases should be given some form of anesthetic.

One case in this series had a musculo-spiral nerve paralysis which cleared up in a few weeks following injury.

In the separation of this series in two groups, the age of sixteen was selected, because this is the generally recognized age of ossification of the epiphyseal centers about the elbow joint.

Removal of the radial head was not carried out in any case. The main reason for this was to see what motion could be obtained without removal of the radial head. Later on the radial head could be removed if ankylosis appeared. No case was complicated with pneumonia and no deaths occurred.

The position of the forearm was in supination, except in isolated fractures of the internal condyles, when the position of pronation was used.

Right angle flexion of the elbow was generally used in the isolated olecranon fractures, but further flexion, if possible, was always used in cases where the lower end of the humerus or two or more fractures of the elbow were present. The fundamentals of this treatment are position of the arm; adhesive lateral pressure and wooden board splints, the latter being tightened as necessity warrants; frequent inspections and as much flexion at the elbow as possible in order to hold the fragments but not to impair circulation; and active and passive motions.

Dr. Cohn (closing).—I do not advocate open reduc-

tion as a routine treatment for fractures. Our clinic in the Tulane University is most conservative.

Nerve injury associated with bone injury is a thing which we ought to know more about. The textbooks tell us nothing.

Dr. Shipley (closing).—Very few of our fractures of the forearm are opened. The vast majority of them are reduced by manipulation. But in the unusual cases where manipulation has failed, a simple open reduction with a minimum of handling, without the application of internal splinting, done with careful technic and carefully splinted afterwards, is good surgery.

FUNGUS DISEASE OF THE SKIN*

By J. RICHARD ALLISON, M.D.,
Columbia, S. C.

The clinical types of fungus disease of the skin that fall under the general heading of epidermophytosis and dermatomycosis have been described by various writers on the subject as trichophytosis of the glabrous skin. The growing tendency to classify all fungus disease of the glabrous skin as trichophytosis is, to my mind, a distinct handicap to the further knowledge of these conditions. It is true that in the majority of instances, the known mycoses of the glabrous skin are due to the trichophytian organisms. There is, however, a wide variety of skin conditions which clinically can be definitely diagnosed as mycotic, but which, in the light of the present inadequate mycological findings, cannot be proven. The writer has often heard competent dermatologists say that it is bad practice to make a diagnosis of fungus disease unless it be substantiated by positive mycological findings. This would narrow the field to a small majority of the so-called, chronic, scaly, pustular and vesicular eczemas, since few conditions have been proven to be of fungus origin. During the summer of 1925 I sent scrapings of thirty clinically well-defined, untreated cases of fungus disease to a well-known dermatological laboratory with positive laboratory findings in only eight of the thirty cases. All of these were typical clinical cases of mycosis. It is my contention that it is good practice to diagnose and treat these conditions as fungus infections since the results are satisfactory, awaiting further discoveries that will classify them definitely in some mycotic group.

The prevalence of fungus disease has been greatly underestimated. Not longer than ten years ago it was not unusual to find writers reporting comparatively few cases of mycotic infection of the glabrous skin. Now, Michael, of Texas, estimates 50 per cent and Hazen, of Washington, 10 per cent of their practice to be of fungus origin. Fifty per cent of the dermatological practice of the South, I believe, would represent a fair estimate, and 20 per cent in the Northern states. In other words, we see from 30 to 40 per cent more fungus disease than Northern dermatologists. There is a large per cent of cases in the South, and they are, on the average, more acute, more severe, and in many instances much more difficult to cure. Some writers maintain that there has not been an increase in the number of mycoses; that the apparent frequency has been a lack of recognition of the disease. To those with a wide experience in the treatment of mycosis, this position is not tenable. That all forms of mycosis at certain periods are contagious is well established. This, together with the inadequate methods of treatment, accounts for the rapidly increasing prevalence of the disease. Experiments have shown that the usual pathogenic fungi found in the skin are very resistant. The fact that one observer has been able to culture a fungus from a sock of an infected patient after the sock had been through a steam laundry is one good explanation for the continued increase of this disease. There are many sources of dissemination, such as swimming pools, public baths, gymnasiums and clubhouses. That these conditions are directly contagious and can be transmitted from one patient to another is clinically, definitely proven. It is seldom that we find a mycosis of long standing in one member of a family only.

The method of inoculation is rather obscure. We know that moist, damp, poorly-ventilated areas are more subject to fungus infection and we conclude, therefore, that such conditions are conducive to the implantation of the fungi. In addition to this, however, there are two sources of infection which seem to have been neglected, and which are important to bear in mind. Many patients who present themselves with a mycosis, often of many years standing, will trace the origin of the condition to a severe attack of dermatitis. venenata. In the Southern states this dermatosis arises from many different plants, and due to poor treatment is often followed by chronic pustular infections, for varying periods of time, which furnish a frequent and profitable

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

field for the implantation and growth of fungi. It, therefore, behooves us in the treatment of acute dematitis due to external irritations, to take certain precautions to prevent complications. Secondly, mycosis of the nails often develops following an injury, an acute infection of the matrix or both with the resultant loss of the nail. Following such accidents or conditions, we have a chronic fungus nail, spongy in character, moderately deformed and subject to recurrent acute pustular inflammations. Mycosis of the hands and feet, adjacent to these conditions, is often directly due to such nails and cannot be cured until the origin or source of the infection is removed. A third common and more or less neglected origin of mycosis is the dyshidrotic or hyperhidrotic skin, which will be discussed later.

The clinical types of mycosis of the glabrous skin have been described by James Mitchell of Chicago and others. The three main classifications of these so-called clinical types of trichophytosis or mycosis as they should be called, are first, the acute vesiculo-pustular eruptions, second, chronic intertrigo of the toes and fingers, and third, chronic hyperkeratosis. These three types, as generally described, are well known to dermatologists. There are, however, certain variations from the accepted forms which are worth considering. There are two distinct types of the acute vesiculo-pustular variety which should be considered as two separate conditions: first, there is an acute superficial vesicular type which spreads on the sides of the feet, fingers and to the legs and arms, and is more or less circumscribed. This condition resembles very closely dyshidrotic dermatoses. The vesicles may remain for twenty-four to forty-eight hours before becoming pustular, and are always superficial in character. This type of condition usually becomes scaly and accumulated in a short time a thick, scaly lesion, especially on the feet. The condition responds readily to the proper treatment. The second type is a deep pustular condition, the initial lesion manifesting itself in deep-seated pustules, the size of the pustules varying according to the age. The patches are more or less circumscribed, spread rapidly, and while there is a slight tendency to hyperkeratosis, the general tendency is to destruction and ulceration of the surrounding tissues. In many cases, one will find, after the removal of apparently healthy callus and thick keratotic skin, patches of these deep-seated pustules varying in size according to their age, which apparently are not the causative factors of the keratosis, but in some way are implanted in the soft tissues beneath the normal callous lesions. This variety of fungus disease, more common on the hands and feet, may occur on the distant portions of the body and extremities. It is very resistant to treatment, spreads rapidly, and I think must be of different origin from the superficial vesicular type. The second classification, the intertrigous type, is a vesicular eruption which, due to the location, presents a sodden mass of dead tissue, the typical appearance of which is well known. The third group, the chronic hyperkeratotic type, is confined to those conditions which produce callus and a thick horny layer, usually confined to the hands and feet. Mitchell says that the development of these three types and their subsequent course depends on three factors: "First, the number of vesicles and their distribution; second, location of the lesion; and third, the type of the invading organism." This is believed to be essentially true, but the third assumption, that the type varies with the invading organism, about which little is known at the present time, compels us to include from a clinical and therapeutic point of view, many conditions not definitely classified as mycosis.

In the differential diagnosis of epidermaphytosis, several important conditions must be considered. First, dyshidrosis is often confused with mycosis, and some writers have even asserted that dyshidrosis as a clinical entity does not exist. We have, however, sufficient clinical evidence to warrant the retention of certain clinically dyshidrotic skin conditions, especially pompholyx, mainly I believe, because several of these conditions are made distinctly worse by all the ordinary measures used in the treatment of mycosis. In a typical hyperhidrotic skin, with its recurrent attacks of acute vesiculation, during the summer months, we are often confused as to whether the condition is mycotic or simply dyshidrotic, and even after a diagnosis of dyshidrosis is made, we are often puzzled as to whether or not a mycosis has been superimposed on the original condition. The differentiation of fungus disease of the hands from a large group of chronic dermatoses that might be classified in a general way as occupational dermatoses, in my experience presents the greatest difficulty. It is agreed by all that positive mycological findings in conditions of the hands are more difficult for the simple reason that it is seldom we have presented to us the initial lesion untreated and uncomplicated. We are

therefore, in the majority of instances, forced to make a diagnosis on the clinical and historical data.

There is another type of eruption on the hands that manifests itself as recurrent thick, scaly, more or less circumscribed keratosis and often excoriated lesions that respond usually readily to treatment, but show a marked tendency to recur, that are very difficult to diagnose. These conditions are often purely occupational and are made worse by the application of strong ointments. In the consideration of this class of conditions, we have the same problem as in the dyshidrotic type: that is, in those cases that are purely occupational, it is often difficult to tell when mycosis has been superimposed. These two types are apart from the usual described mycosis of the hands, the typical description of which is a maceration of the epidermis at the base of the interdigital clefts, leaving a bright red shiny surface, sometimes moist and sometimes dry, often spreading by direct extension to adjacent parts of the hands and feet. This type is not difficult to diagnose. It is my belief, however, that such typical cases form only a small portion of the mycoses of the hands.

In the further consideration of the differentiation of fungus disease, it is important that we bear in mind the subject of trichophytids. A dry, scaly eczema occurs on different portions of the body, due to absorption of toxins produced by the parasite and carried through the blood stream. The existence of trichophytids as a separate entity is well established. My experience with several cases of extensive fungus disease of the hands and feet, including the nails, in which there was an associated generalized dry, scaly eczema, confirms my belief in the theory of trichophytids. All of my cases were in old people with moderately thick hyperkeratotic lesions of the hands and feet and extensive involvement of the nails. The importance of the nails as a constant source of infection, and often as an aid in the differential diagnosis of fungus disease, is not sufficiently emphasized. Mycosis of the glabrous skin, associated with fungus nails, cannot be permanently cured until the source of the infection is eradicated.

The treatment of fungus disease of the skin requires more than the knowledge of a few parasitic preparations and the ability to use the x-ray and ultra-violet ray. No one method of cure is applicable to all types of mycosis, and the success in all cases depends, not so much on the method chosen as it does on an intelligent understanding of the particular condition to be treated. The location, the duration, the type of skin, the character of the lesion, whether superficial or deep-seated, whether destructive or keratotic, must all be considered in outlining a plan of treatment. Only experience can give this knowledge. Whitfield's ointment, chrysarobin in chloroform, iodin in benzol, hot soaks in bichlorid, permangenate and other solutions, ultra-violet ray and x-ray and ionization are all used at different times by the writer. The judicious application of these remedies with mechanical removal of dead tissue and the opening of vesicles and pustules constitute the treatment of fungus disease of the glabrous skin.

Medical Building.

Discussion follows paper of Dr. Kirby-Smith, page 610.

TRICHOPHYTOSIS, A DERMATOLOGICAL PROBLEM IN THE SOUTHERN STATES*

By J. L. KIRBY-SMITH, M.D., Sc.D.,
Jacksonville, Fla.

From the point of view of Southern dermatologists, we shall all agree that trichophytosis occurs extensively in our practice, and constitutes a problem, both as to its cure and prevention. Particularly is this true for those situated in the lower part of the Southern states, for in warm or rainy seasons in these sections the affection closely assumes an epidemic in its frequent occurrence.

I wonder how many of you present have analyzed your case history cards, and have estimated what percentage of your practice is made up of this parasitic skin disease. You will be greatly surprised at the number of ringworm infections that you have had.

This past summer in Florida the rainfall was heavy. This, with the usual summer heat, produced such an increased number of ringworm cases that the writer's attention was directed toward this situation, and the report today is the result.

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

Fig. 1, Case 1
Mrs. B.—Generalized trichophyton infection began ten years ago in genitocrural region. Eruption becomes markedly scaly in winter time. Husband and children are not affected.

Statistics as a general rule are not very interesting; nevertheless the following are the figures that were obtained from an analysis of 1,525 case history cards, these being the total of new patients entered on my books for the first ten months of this year. Four hundred and eighty patients were diagnosed as having ringworm infection, giving a percentage close to 33.33. During the rainy summer months of June, July and August, two hundred and fifty cases of ringworm were seen, out of a total office practice of five hundred and fifty new patients. In other words, during those three months the ringworm patients constituted about 45 per cent of the writer's practice.

The following is a brief summary of the information gained from the study of these four hundred and eighty records:

120 patients with lesions of the hands as their only complaint.

250 patients with lesions on feet or toes.

90 patients with involvement of the genitocrural region, 80 of these showing extensive lesions on the body other than their genitocrural complaint.

50 patients with pruritis ani, 43 of these showing other parts affected with ringworm disease.

10 patients with nails affected.

25 patients with lesions on one part of the hands and no other part involved.

52 patients with gluteal region involvement as their only complaint, and of these 23 showed an infection of the genitocrural region as well.

25 patients with axillary lesions, bilateral, with feet or genitocrural region involved.

15 with infection of the mammary region, five of these having lesions on the genitocrural parts.

Strange as it may seem, only six cases of tinea tonsurans, or ringworm of the scalp, were seen by the writer out of a total of four hundred and eighty ringworm cases observed during the ten months.

Three patients showed generalized involvement of the skin. One patient showed a universal involvement, excepting parts of the face and scalp.

Three hundred and fifty patients gave a history of previous attacks of the trouble. Two hundred and seventy-five patients stated that other members of the family had had symptoms of this disease.

Fig. 2, Case 1
Side view.

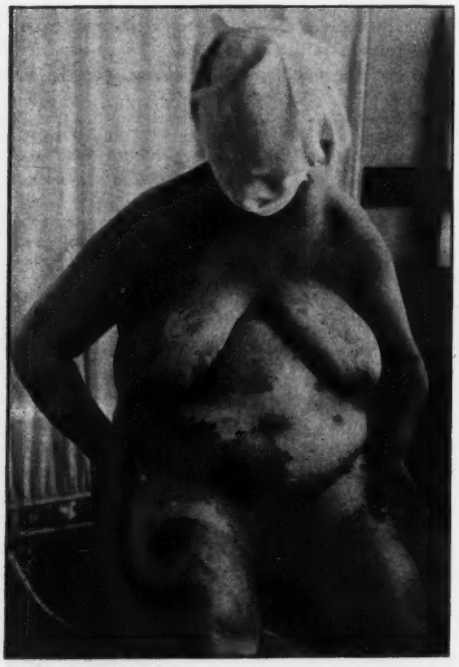

Fig. 3, Case 1
Front view.

Certainly no other skin condition in the writer's territory causes such a large proportion of patients to report for treatment.

During the past year H. H. Hazen, of Washington, in association with the U. S. Public Health Service, endeavored by questionnaires to obtain information regarding the prevalence and severity of this disease. Because of the wonderful work of such American dermatologists as Whitfield, Ormsby, Mitchell, Hartzell and others, we now know that various skin conditions which were oftentimes formerly called "bromidrosis," "dysidrosis," "intertrigo," "mycotic eczema" or "orbicular eczema," often are merely different types of ringworm infection. The diagnosis of ringworm disease does not now present any difficulty, except when certain conditions brought about by overtreatment sometimes obscure the original trouble. In a case of this kind, the dermatologist is confronted with a violent chemical irritation or an x-ray burn.

With the knowledge we now possess, it is seldom that we find it necessary to resort to the microscope or to cultures to diagnose ringworm. To be sure, it is interesting to know whether or not some particular case is due to the epidermophyton inguinale, to the microsporon, or to the trichophyton fungus. The writer has been greatly confused on this score. Scrapings from typical looking epidermophytosis of the crural region have proved to be trichophyton fungus.

A patient of mine during the winter had a mild intertrigous condition of the toes and crural region, and later developed very extensive inflammatory and deep-seated ringworm patches scattered over the trunk and gluteal region. This eruption was of the trichophyton fungus type and the lesions were resistant to the treatment ordinarily prescribed, showing that the clinical diagnosis of epidermophytosis could not hold.

Another patient with the usual toe and crural complaint was questioned about his family. The wife reported with a vesicular eruption on hands and feet, and she had patches under the breasts and between her toes. Within that week, a visit was made to the home of the patient to examine the three children. The youngest, aged 4, had at least a score of typical ringworm lesions. The other children, aged 7 and 9, had two or more of the same kind. The oldest child also had toe symptoms.

The children's diagnosis would no doubt appear on the history cards as "tinea circinata," and that of the father and mother as "epidermo-

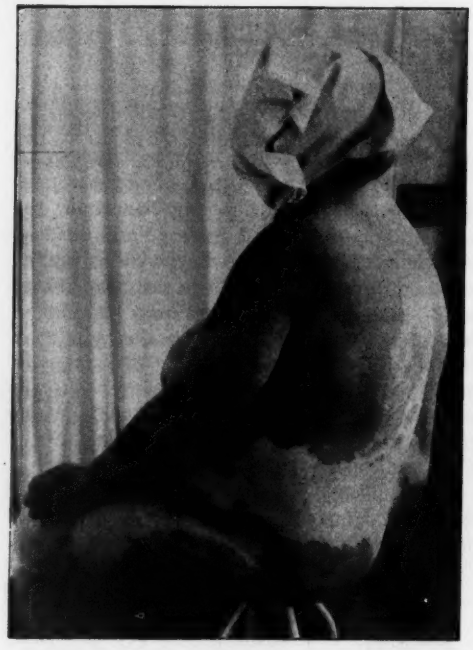

Fig. 4, Case 1
Back view.

Fig. 5, Case 1
Close-up view of flanks of patient.

phytosis." All are ringworm diseases, and, to my mind, originate from the same vegetable fungus, but act differently under different "soil" conditions. No doubt this is open to discussion. The illustrations, *Figs. 1 to 5, Case 1,* of an extensive ringworm infection are from one of a number seen by the writer during this past year.

The case is that of a middle-aged woman of large proportions, who is none too careful in her personal hygiene. She has had the disease, undiagnosed, for fifteen years, but treated from time to time with various local and internal medical measures. The scrapings show epidermophyton inguinale. Treatment with Whitfield's ointment apparently cleared up the lesions in three weeks. After ten days the patient became re-infected, and new lesions of a small ring type rapidly developed over various parts of the body. At the present time, these are almost cured. This patient occupies a bed with her husband, and he has never developed a lesion on his body. He is a small dry-skinned individual and seems very particular about the cleanliness of his person.

The matter of the contagion of ringworm is quite a problem. At times we are confronted with a situation that is embarrassing. We effect a cure, or apparently so. The patient is satisfied and so are we. Although he is given definite instructions as to the care of his nails, clothes, shoes, bathroom floor, so forth, and then dismissed, he returns to see us in a few months. A new infection, yes, but that is what the patient does not understand. This is one of the problems of ringworm. How are we to educate our patients to prevent them from having a re-infection? How can we immunize them against ringworm? No doubt in time we shall be able to vaccinate against this infection. But in the meantime, we must teach the patient that the failure to effect a cure is not due to our treatment, but to indifference on his part in carrying out our instructions.

Illustration of posterior view right axilla is interesting, *Fig. 6, Case 2,* as this axillary involvement is an unilateral lesion of very active growth. The patient has no other skin complaint, the infection having been noticed four weeks previously. It began a few days

Fig. 6, Case 2
John S., age 26. Trichophyton infection, three months' duration. Posterior aspect right axilla and arm. No other lesions.

after he had worn a rented bathing suit at a local ocean bathing resort.

We are all familiar with the epidemic occurrence of ringworm infection sometimes seen in gymnasiums, bath houses, boarding schools, and other institutions. These and other outbreaks could be prevented by proper hygiene. The same might be said of our public schools with their innumerable cases of ringworm infection of the scalp.

We, as dermatologists, are the proper ones to educate the public and to aid in the prevention of this common and distressing skin disease. If we do nothing more, we should stress before the health authorities the prevalence of the disease in our Southern states.

The cure of ringworm, in most cases, is not very difficult to effect, although there are several factors which may tend to retard or to aid in permanent cures, some of these being: the location and type of lesions, the mentality and type of patient, his occupation, as well as the season of the year. When excessive perspiration is present, either functional or climatic, sometimes the results are disappointing. New foci of infection appear when a cure is expected. Then oftentimes, the patient's occupation will not permit the proper carrying out of directions. Then, also, the lack of intelligence on the part of the patient is a retarding factor in the cure of this disease.

In the treatment of ringworm infection we must pay attention to every detail. Not only is the proper treatment essential, but a thorough understanding on the part of the patient of how to carry out directions is equally important for good results.

500 Professional Building.

DISCUSSION (Abstract)

Papers of Dr. Allison and Dr. Kirby-Smith

Dr. Joseph A. Elliott, Charlotte, N. C.—A discussion of eczematoid ringworm is very timely, due to the fact that there is an increase in the prevalence of this disease and the infection is becoming in many cases more virulent. Hazen has made a survey of this disease throughout this section of the Country and he has found it to be an economic problem of considerable importance.

Before we can thoroughly understand ringworm infections, we must know more about the mycology of the disease, and I trust that productive work along this line will be done in the near future. We are indebted to Ormsby and Mitchell for bringing the etiology of the disease to our attention. Before their work was published, most cases of eczematoid ringworm were classed as dyshidrosis by American dermatologists. Some physicians today believe that nearly all of the cases formerly diagnosed dyshidrosis should be classified as eczematoid ringworm and that the few remaining cases are probably produced by some external irritant. Eczematoid ringworm is undoubtedly more prevalent in the South than it is in the North. Ten per cent of the new cases entering my office have been diagnosed ringworm. This percentage is about the same as Hazen's. It is decidedly lower, however, than Allison's, of Columbia (40 per cent), and Kirby-Smith's, of Jacksonville (33.33 per cent).

A very large percentage of ringworm cases respond in a few days to systematic treatment. There is a small percentage that do not respond to treatment, however, and such cases present a real problem to the dermatologist.

Dr. Jack W. Jones, Atlanta, Ga.—I had occasion about one year ago to go over my records for a paper on this subject. It surprised me at that time to know that over one-third of my patients were ringworm cases. In the summertime the per cent runs higher. To me this is the most important subject with which the dermatologist in this part of the country has to deal. I was talking with a colleague the other night, and he said if it were not for ringworm he would have to close his office. If something is not done in the way of preventive measures in our clubs, Y. M. C. A., gymnasiums and swimming pools in Atlanta, only those possessing a high resistance to ringworm will escape the infection.

Some cases are a great deal more difficult to diagnose than is generally considered. Of course, the clear-cut cases offer no difficulty. The cases that have given me more trouble and more worry are the hand cases. I made the remark yesterday that I could never thoroughly satisfy myself as to whether the cases on the hand are parasitic or irritative. One case will respond to parasitic treatment and the next case, showing the same symptoms clinically, will get worse. Also my experience in microscopical work in this type of case has met with very little success. As Dr. Elliott said, someone will have to do more work on the organisms causing this eruption. I have done very little in the research line, but the type of organism to be found in the type of eruption on the hand of which I speak is very probably not caused by the ordinary organism we see in other locations than the hand.

Treatment of this condition depends almost as much upon the individual resistance of the patient as it does on what we prescribe. Some patients clear up on anything; others are resistant. A number of authors have recommended that we use mild treatment in the beginning of these cases when they are acute. I have tried that. When I am certain of the diagnosis of ringworm, I adopt ringworm treatment. The other procedure delays results. If it is ringworm, I believe it should be treated as ringworm and not with soothing applications. We should not subject the patient to delay or a chance of infecting others.

Dr. F. M. Johns, New Orleans, La.—I have been very much interested in the diagnosis of ringworm infection by microscopic examination. I believe I am safe in saying that a review of the prominent dermatological books reveals the statement that diagnosis may easily be made by cultures or by examining the scrapings suspended in 10 per cent potassium hydrate solution. The matter is usually dropped there, and my experience is

that the average observer soon gives up the search for fungi in disgust.

Cultures of the fungus of the genus epidermophyton, as found in ringworm infection of the scalp, body or nails, and of the genus malassezia, as found in pityriasis, are most difficult to obtain, and are less certain than one requires for diagnostic procedure, whereas carefully made scrapings which are properly digested in 10 per cent sodium hydroxid are relatively efficient in showing the presence or absence of a fungal infection. My experience further leads me to state that the average examiner does not appreciate the fact that these tissue scrapings must be thoroughly digested before the presence of fungi can be demonstrated with certainty. For instance, a piece of infected toe nail is removed, placed on a slide and covered rather liberally with 10 per cent sodium hydroxid. This is placed in a petri dish on a blotter saturated with water and allowed to digest for many hours, frequently as long as twenty-four hours when necessary, thoroughly to separate and liquefy the epithelial cells. The excess of hydroxid is then carefully blotted away and a cover glass is pressed down on the residual mass and examination is made with a low dry lens with an attempt to examine all of the material removed. The verification of objects suspected of being fungi found with the low dry lens may be made with the higher magnifications of the microscope. Stronger solutions of hydroxid will frequently cause the fungi themselves to disintegrate.

Dr. Cosby Swanson, Atlanta, Ga.—The treatment of fungus diseases of the skin should be considered from the following standpoints: the systemic condition of the patient, season, type of eruption, location, complications, and the patient's occupation. A large number of patients whom I see with fungus infections are also suffering from one or more of the following conditions: infected tonsils, teeth, gums, gall bladder, chronic appendicitis, nephritis, so-called intestinal fermentation and faulty elimination. To apply strong applications like Whitfield's ointment and preparations containing salicylic acid and chrysarobin to one suffering from one or more of the above conditions would inflame the parts and cause the patient to become discouraged and discontinue treatment.

Many patients who apply for treatment have a pyogenic infection in the same area with the fungus infection, which causes acute inflammation, pustules, and in some cases cellulitis and lymphangitis. Before they use the strong applications that are necessary to destroy the parasitic infection, the pyogenic infection must first be cleared up.

When the infection appears on several parts of the body, as it often does, the strength of the application has to vary with the part of the body affected. Moist areas like the genitocrural and axillary regions require weaker applications than those used on hands and feet. In the acute, vesicular type and on moist patches, drying applications are preferred, followed by ointments when the skin becomes dry and scaly. I find, as a rule, during warm weather it is necessary to use weaker applications than during the colder seasons. Many patients with fungus infection on hands and feet have infected nails. To prevent recurrence of infection of the skin it is necessary to treat the nails at the same time. I have found soaking the nails in warm water and then applying salicylic acid paste, followed by tincture of iodin, is very effective; also barium sulphide paste, as advocated by Dr. Andrew L. Glaze.

The occupation of the patient must be considered, as the infection is often aggravated by chemicals and other irritants with which he comes in contact.

One reason why more patients are not permanently cured is that they discontinue treatment before all the organisms are killed. When treatment is used for a short time the eruption on the skin is apparently cured but the organisms remain dormant in the deeper structures of the skin and shortly after treatment is discontinued they become active and cause a recurrence of the eruption.

Dr. J. C. Michael, Houston, Texas.—Like Dr. Elliott, I have wondered whether varieties of organisms had anything to do with the appearance of the disease and stubbornness of some cases. I have cultured many cases, particularly with the object of finding, if possible, whether the stubborn cases showed a different type of organism. I was unable to find any particular species in these cases. The majority of the cases I saw of ringworm of the hands and feet were due to the organism (T. interdigitale) found by Ormsby and Mitchell, of Chicago. The question of "soil" in this disease is of some interest. Experience teaches that local factors have a great deal to do with the activity of this disease. Local factors must have something to do with the patient getting infected.

I know of nothing new in the treatment of this disease. It must be treated according to the stage of the disease.

As to microscopic diagnosis of the eruption, in most instances almost any sort of protective greasy application will cause mycelia to disappear from the scale.

I have never been able to culture the fungus where I could not find it in the scale itself.

Dr. Thos. W. Murrell, Richmond, Va.—I should like to ask Dr. Shelmire if his father still uses acetic acid. A quack in Richmond apparently cured a few cases with a nostrum he puts up that is nothing but acetic acid.

Dr. Allison (closing).—It is impossible for one man to carry on a mycological study of any value. Scrapings taken in the office and studied are very often unsatisfactory. It has been my practice to heat the scrapings in potassium hydroxid, which has the same effect as letting them stand for a certain period of time. I hope some day all of us will have a well equipped mycological laboratory somewhere available to send cultures and scrapings for definite study and classification. Such a laboratory under competent and well-trained men, supplied material by dermatologists over the country, would be of benefit to all.

The mycotic origin of pompholyx is doubtful. I believe there are cases of pompholyx which are not mycotic in origin, for the reason that such cases are made distinctly worse by ordinary anti-mycotic treatment.

Types of lesions vary with the season. In the winter there is a preponderance of keratotic lesions, and in the summer a preponderance of vesicles and lesions with maceration.

Treatment in this paper was outlined in only a general way. There are, however, certain fundamental principles to be considered in treatment: first, lesions should be well drained. This is best obtained by scraping, opening and draining vesicles and pustules; second, by avoiding occlusive dressings made of inert powders; lastly, one should bear in mind that the treatment of fungus nails is as important as the treatment of the adjacent skin lesions. The skin condition cannot be

permanently cured as long as there is an adjacent fungus nail.

Dr. Kirby-Smith (closing).—The majority of us who are interested in mycology are very busy practicing medicine and have very little time for laboratory work. It is an interesting problem, and the time spent in studying the ringworm fungi is well placed. In the treatment of an acute epidermophytosis of the hands or feet, most of us no doubt use soothing treatment, and this with x-ray treatments usually gives good results. But it is my experience that most patients report with a severe secondary dermatitis, and it is quite a problem to cure them. An overtreated epidermophytosis oftentimes becomes a painful and disabling disease. I have just discharged as cured a man who lost two months from his occupation, and who spent three weeks in a hospital from an infected dermatitis following an overtreated acute epidermophytosis of his hands and feet.

CHRONIC FRONTAL SINUSITIS: SURGICAL TREATMENT*†

By ELBYRNE G. GILL, M.D.,
Roanoke, Va.

The achievements in the surgical treatment of nasal accessory sinus infections, particularly of the frontal sinus, during the past thirty years constitutes one of the most important and valuable chapters in the entire realm of surgery. While we are truly mindful of these accomplishments, the fact remains that the recognition and surgical cure of chronic frontal sinusitis remains a problem, which at times taxes the skill and ingenuity of the most experienced and skilled surgeon.

As one scans the literature, he finds numerous methods describing a means of approach to the same goal. This alone means dissatisfaction. From the mass of literature, one finds two groups of workers, one believing in establishing ventilation and free drainage of the frontal sinus and the other advocating a complete obliteration of the sinus. The writer subscribes to the views of the latter. When attempting to remove chronic foci of infections in tonsils, teeth, gall bladder or appendix, we obliterate the offending member. The same argument should apply in dealing with a chronic infection of the frontal sinus. When we say chronic infection, we mean that the mucous membrane has been infected and in some instances destroyed. There is no hope of physiological restoration. The sinus has consequently no function to perform, so why not obliterate it completely? It has also been noted by some of our most careful observers that the openings made in the floor of the frontal sinus or the enlargement of the naso-frontal duct after the manner of Lothrop, all close, regardless of the size at the time of the operation. This result was emphasized by Lynch in discussing Beck's paper before the American Academy of Oto-Laryngology in 1920. This observation caused Lynch to abandon the Lothrop operation and devise the operation published by him in the *Laryngoscope* in January, 1921.

A review of the literature reveals a tendency of writers to report complete cures before sufficient time has elapsed to be certain whether a cure has been effected. At least three years, and possibly five, should be the minimum time limit.

Having decided that obliteration is the method of choice, the question then arises in the minds of many observers, can obliteration be accomplished? The technic, which will be described, has been used by us during the past eighteen months: consequently we cannot give our final conclusions. We present it for your consideration and time will prove or disprove its merit.

Everyone recognizes the importance of having satisfactory roentgenograms made before performing any operation upon the frontal sinus. In this connection, emphasis should be given to the importance of studying the roentgenograms by the operator rather than accepting a written or verbal report from the radiologist. This is not intended as a reflection upon the radiologist's ability to interpret his own plates. It is only reasonable to expect that the rhinologist who limits his work to this particular field should interpret the roentgenograms. Since our final results often depend upon the technic employed, we urge strict attention be given to every detail. We operate under general anesthesia (gas and ether). The field is prepared by cleansing the entire face and forehead with green soap and water. Three and one-half per cent iodin is applied, then removed by alcohol. The nose is first irrigated with saline solution, then the side involved in the region of the middle turbinate is packed with a cotton moistened in 4 per cent solution of cocaine. A post-nasal plug of sufficient size to prevent blood from entering the throat is introduced. This is removed immediately following the operation. Both eyes are covered with narrow strips of gauze held in place with sterile adhesive.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

†From the Department of Oto-Laryngology, Gill Memorial Eye, Ear and Throat Hospital.

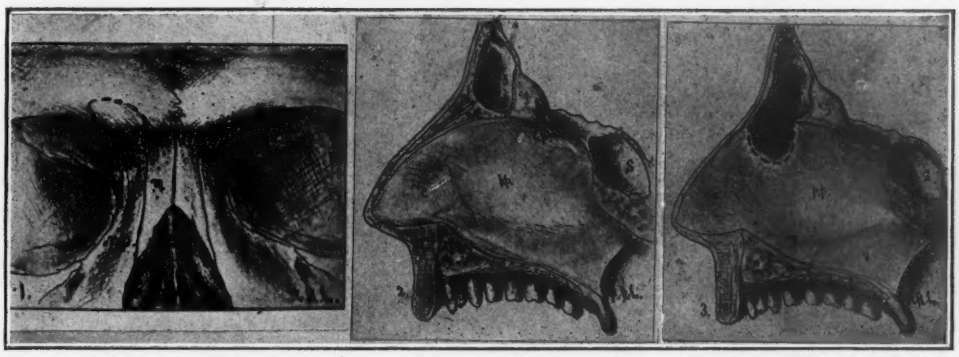

Fig. 1 Fig. 2 Fig. 3

Fig. 1.—Anterior view frontal region; projected outline of opening into sinus through which all extranasal operating is performed on both sinuses; (n) nasal bone; (np) nasal process; (s) septum; (l) lacrimal bone.

Fig. 2.—Nasal septum, also the dense bone below frontal sinus (F) in the median line; (n) nasal bone; (ns) nasal spine of frontal bone; (cg) crista galli; (cp) cribriform plate; (S) sphenoidal sinus; (pp) perpendicular plate; (c) triangular cartilage; (v) vomer.

Fig. 3.—Nasal septum seen in Figure 2 after removal of floor of both sinuses looking into the right sinus. The median projection of the crista galli and cribriform plate region is shown, also the portion removed by burrs from the perpendicular plate of the ethmoid, thus allowing easy access to both sinuses through either nostril.

From Lothrop's articles, Journal of the American Medical Association, Vol. 65, page 153, July 10, 1915, with consent of Editor.

The incision and mode of approach are similar to the method described by Killian in his paper published in 1903 in the *Archiv f. Laryngol.* It is made through the unshaven brow. At first the incision extends about one inch and is extended if the sinus is found to extend much beyond this limit. Cross-cut incisions are made to insure even approximation of the suture line. Particular care is made not to disturb in any manner the periosteum over the orbital arch. The periosteum over the anterior wall is gently elevated. It should not be elevated the slightest distance beyond the upper or outer limits of the sinus. The fact that periosteum does not readily reapply itself to bone has been strongly emphasized by Lynch and others. To secure obliteration, the anterior wall in its entirety must be removed. Every vestige of mucous membrane is thoroughly removed. The sinus is now swabbed with iodin and packed with cotton moistened in adrenalin. The incision is now extended in a curved manner over the orbito-nasal angle. Thus far our procedure is similar to Killian's.

Our treatment of the periosteum covering the floor of the sinus and inner wall of the orbit differs in that we do not disturb the attachment of the superior oblique muscle or the lacrimal sac, nor do we expose or remove the entire floor of the sinus. Enough of the floor is removed to admit a rubber tube about one-fourth of an inch in size. An opening of similar size is made through the lower edge of the nasal and upper part of the lacrimal bone. The ethmoid cells, if they have not been previously removed, should be removed at this time. A rubber tube, one-fourth of an inch in diameter, is now brought through the nose. The distal portion is in the sinus. The tube is left in position for one week. A probe is passed through daily in order to promote drainage. The wound is closed with either metal clips or dermol sutures, which are removed on the fourth day. A pressure bandage is worn until the sinus is obliterated. This is the most important feature of the after-treatment. No intranasal treatment other than cleansing the nose is required.

Harris, in discussing this subject before the American Medical Association in June, 1921, stated:

"The fact that in a great majority of sinuses the diseased condition resolves when the floor of the sinus has not been removed, would indicate that removal of the floor, as recommended in the Killian operation, is not necessary."

In this same discussion, he quotes Mouret as follows:

"I have been asked why I do not resect the orbital wall of the sinus, and when I preserve the lacrimal bone and the orbital part of the fronto-nasal apophysis when the too great dimensions of the sinus compel making an opening in the orbital wall. I find these objections to such a removal:

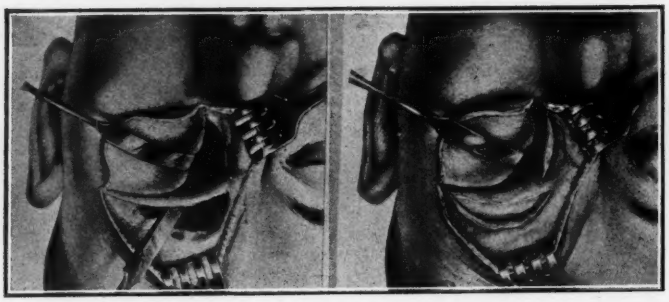

Fig. 5 Fig. 4

Fig. 4.—Killian's operation. Elevation of the periosteum.

Fig. 5.—Killian's operation. Removing the inferior wall.

From Loeb's Operative Surgery with the consent of the author and publisher. (Figures are in reverse order through error in making cut—Fig. 4 is on the right and Fig. 5 on left.)

"(1) Falling in of the soft peri-ocular tissues.

"(2) Primary or secondary and recurring infection of the peri-orbital tissues.

"(3) Stenosis of the naso-frontal canal.

"(1) *Falling In of the Soft Peri-ocular Tissues.*—In the resection of the orbital floor of the frontal sinus Jacques (and Killian) found that the soft tissues fall into the sinus cavity and tend to obliterate it. This advantage can be real for the orbital prolongation of the sinus, but does not suppress the upper frontal portion of the sinus.

"(2) *Primary or Secondary Infection.*—Inflammatory attacks of the soft tissues at the superior internal angle of the orbit take place several weeks, and even months, after operation, when the patient is considered well. These can keep on recurring. The explanation seems to me to be found in the fact that apart from infection externally due to a cold, the soft subfrontal tissues can contain germs, the remains of the sinus infection. These germs remain for a long time dormant, to become active from some undetermined cause. By not uncovering the inferior face of the orbital floor of the frontal sinus, and thus not making a direct communication with the frontal sinus, we avoid these cases of infection.

"(3) *Contraction of the Fronto-Nasal Duct.*—The chief objection which I have to the large orbito-nasal resection is not only that the soft tissues fall in toward the sinus and are in direct contact with the sinus cavity and with the germs of infection which it still contains in spite of operation, but that they often lead later to stenosis of the fronto-nasal duct. In a small sinus, the cavity can be filled with fibrous tissue and disappear. This does not apply to large cavities where the Killian operation is alone indicated. In spite of the operation, hollow spaces persist, especially behind the orbital arch, which serves to maintain communication with the nasal fossa. For some days following the removal of any drain put in, everything is perfect. But when the case is seen some few weeks later, we are surprised to find the naso-frontal duct very much narrowed; at times it is even impossible to pass a sound. We are inclined to think that this is satisfactory, and that the closure of the channel of communication means that the sinus cavity has itself disappeared by being filled with fibrous tissue. In such cases, however, I have operated a second time and have found the sinus filled for the most part by fibrous tissue; but on a level with the sinus angle which corresponds to the orbital arch, and with the external fronto-temporal angle, there was granulation tissue."

Objections to the operations which attempt to secure ventilation and drainage, such as the Lothrop operation, may be briefly summarized:

(1) You are attempting to drain a non-functioning space which may become reinfected.

(2) It does not seem possible to remove every vestige of diseased mucous membrane in a large sinus without making a window in the anterior wall.

(3) Opening into a healthy sinus and removing a part of the nasal septum is certainly a serious objection for obvious reasons.

(4) Regardless of the size of the opening made, experience has taught competent observers that they eventually close.

The student who is interested in the technic of the Lothrop operation can find a complete description in the *Journal of the American Medical Association* (65:153, July 10, 1915).

I wish to discuss briefly five cases which came under our observation during the past eighteen months:

Case 1.—A boy of 15 gave a history of having pain over the right eye for the preceding three days. There was considerable swelling of the right upper eyelid. His temperature at the time of examination was 105°. There was no previous history of sinus trouble. The x-ray report was as follows:

Examination of accessory sinuses shows the maxillary antra, left ethmoid cells, and sphenoidal sinus clear, with no evidence of abnormality. The frontal sinus, more especially the right side and right ethmoid cells, show a definite increased density, which is somewhat suggestive of a probable involvement in this region. However, some of the increased density may be due to the superficial swelling of the soft tissues.

Operation was advised. On opening the sinus, pus escaped under pressure. The anterior wall, which was diseased, was completely removed. The sinus contents were evacuated. At this stage of the operation, the patient's condition was so bad that the operation was terminated. The patient very promptly developed erysipelas, which spread over the entire face and neck of the affected side and across the head to the opposite side. This condition continued for about ten days, then subsided. It was our purpose to complete the sinus

Fig. 6 Fig. 7 Fig. 8 Fig. 9

Fig. 6 (Case 1).—Acute exacerbation of a chronic infection of the right frontal sinus, as evidenced by necrosis of the bone covering the anterior wall of the sinus.

Fig. 7 (Case 2).—Fistula in the outer third of the floor of the right frontal sinus. Sinus was filled with pus, polyps and granulation tissue.

Fig. 8 (Case 3).—Chronic infection of the left frontal sinus. Sinus was filled with pus, polyps and granulation tissue. History of three years' duration.

Fig. 9 (Case 5).—Chronic infection of left frontal sinus. Symptoms of four years' duration. Sinus was filled with pus, polyps and granulation tissue.

operation, but we were prevented from doing so, as the patient developed an acute exacerbation of a chronic ear, which necessitated a radical mastoid operation. During the period of convalescence the sinus completely healed and has remained so after a period of eighteen months. The necrosis of the anterior wall indicated that we were dealing with an acute exacerbation of a chronic infection. The patient's recovery is an example of the cases that get well when there has not been any interference with the floor of the sinus.

Case 2.—A woman of 66 was first seen by us in April 4, 1925. The chief complaint was pain and loss of vision in the right eye. These symptoms had existed for four months. Examination revealed a marked protrusion of the right eyeball, increased intraocular tension and also a cataract of the right eye. There was no swelling of lids or tenderness over the frontal sinus. The blood Wassermann was negative. The first x-ray report April 25, 1925, was as follows:

Stereoscopic postero-anterior view of the cranium shows destruction of the margin of the supra-orbital arch throughout its inner two-thirds, with destruction of the orbital margin of the malar process and of the orbital margin of the superior maxilla for its outer two-thirds. This applies to the conditions around the right orbit. The inflammatory process arising from this bone destruction involves the whole of the right orbit, and frontal sinuses and the superior maxillae. The nasal bones look somewhat ragged. Bone destruction without any tendency to repair is generally due to malignancy, and the roentgen features in these skiagraphs are suggestive of sarcoma of the right orbit.

The second x-ray report, July 29, 1925, was as follows:

Roentgen examination, stereoscopic view of the posterior and anterior cranium gives the same features outlined in my report April 25, last, with slightly increased pathologic changes. There is dense infiltration of the frontal sinuses, absorption of bone salts in the margin of the orbital margin of the malar process, and marked changes in orbital margin of superior maxilla. The nasal bones have a ragged appearance. These roentgen features are extremely suggestive of osteo-sarcoma. Examination revealed the presence of a chronic infection in the right frontal sinus, right ethmoid and right antrum.

After consideration of the x-ray reports, together with the fact that the patient had a painful, blind eye, my colleague, Dr. Young, advised enucleation, which was done June 17, 1925, and was followed by a deep x-ray therapy. Microscopic examination of the orbital tissue as well as of the tissues of the eyeball showed no evidence of malignancy. The hyperplasia of the orbital tissues which caused the protrusion of the eyeball resulted from infection in the accessory sinuses. We realized that our patient had a sinus infection, but in view of the information given by the radiologist and the patient's age, we decided that we were confronted with a possible sarcoma of the orbit as well as a chronic sinus infection.

The patient's condition did not improve, and on November 24, 1925, there developed a fistula of the outer portion of the floor of the frontal sinus which discharged foul-smelling pus. At this time the radical operation upon the frontal sinus was performed according to the technic described. The interfrontal septum was missing and both sinuses were thoroughly curetted. It has been a year since the operation and there has been no recurrence of the sinus infection.

Case 3.—A young male, age 19, gave a history of swelling of the upper lid for the previous three years, each year about in the month of March. The first and second attacks were of two weeks' duration; the third, five weeks. There was very little pain during any of the attacks and no nasal discharge. About March 15, 1926, the upper lid began to swell. The patient thought he had something in his eye, or an infection in his eyelids, when he consulted us. The x-ray report was as follows: roentgen examination of the nasal accessory sinuses reveals the frontal sinuses as symmetrical, multilocular, and there is a diminution of illumination of the left frontal. There is diminution of the left ethmoid and diminution of illumination of the left antrum. The sphenoidal sinus is negative. Stereoscopic plates of the left orbit failed to show any evidence of bony perfora-

tion or exostosis. Conclusion: diminution of illumination is present in the left frontal, ethmoid and antrum.

An operation was performed April 14, 1926. On opening the sinus, pus escaped under pressure. The septum between sinuses was healthy and was not disturbed. The same technic was used in this case as in others. The patient left the hospital at the end of one week, and at the end of two weeks resumed his position as a baseball player. At no time was there any diplopia. There has not been any recurrence of the sinus infection.

Case 4.—A woman of 33 had had frontal sinus trouble for the preceding thirteen years. During this period she had had three intranasal operations without any relief. X-ray report was as follows:

The left side shows absence of frontal sinus. The right frontal sinuses are small and definitely cloudy. The antra and ethmoids are clear.

Radical operation was performed August 18, 1926. The frontal sinus was very small and was filled with thick muco-purulent material. The patient left the hospital at the end of a week and has since remained well. Prior to this operation pain was a constant symptom which at times required opiates for relief.

Case 6.—A man, age 40, consulted us September 26, 1926. He had had pain in his left eye for the preceding week and had a similar attack six months before. The upper eyelid was red and swollen, causing a complete closing of the left eyelid. The x-ray report was as follows:

The frontal sinuses on both sides are cloudy; the right antrum is definitely cloudy; the left, slightly cloudy; the right ethmoid is slightly cloudy, and the left, clear.

External operation was advised and performed September 28, 1926. When the sinus was opened, pus escaped under pressure. This patient has made an uneventful recovery, except for a slight stitch abscess which occurred on the fifth day following the operation.

COMMENT

The cosmetic result is not to be dreaded if a broad orbital arch is preserved. The cases here presented will support this statement. Furthermore, cosmetic results should not be the chief consideration in a life-saving operation.

CONCLUSIONS

(1) Radical operation upon the frontal sinus is indicated in cases of chronic suppuration that will not respond to intranasal surgery.

(2) The mortality in uncomplicated cases is very low, provided the operation is performed by one who is thoroughly familiar with the anatomy of the frontal sinus and its adnexa.

(3) Any operator who fails to interpret his own roentgenograms is inviting disaster sooner or later.

(4) If complete obliteration is to be accomplished, a pressure bandage over the anterior wall must be applied and during this time the fronto-nasal opening must remain patent.

(5) Following the technic described we have avoided having diplopia in any of the cases. While this symptom usually disappears, it is very annoying and prolongs the period of convalescence.

Discussion follows paper of Dr. Heitger, page 622.

INCIDENCE OF SINUS DISEASES AMONG CHILDREN OF THE GULF COAST*

By CHARLES A. MCWILLIAMS, M.D.,
Gulfport, Miss.

During the discussion of various papers dealing with sinus disease in children read before our national societies, the claim has been made that sinus disease in children is rare in the Eastern states, and very common in the upper Mississippi Valley. From my experience, it is rather common in the lower Mississippi Valley and along the Gulf Coast.

When Dean reported that he had found many cases of sinus disease in infants and children several years ago, it was thought that the peculiar changeable climate of Iowa was largely responsible for the condition. Since he advised his cases to seek a warm, moist climate in the winter, and reported marked benefits from a change of climate, it was thought by many that sinus disease in children would not be found in such a climate as we have along the coastal country.

Acute infection of the upper respiratory tract is probably the most common disease met with, and it is quite generally thought that climate plays an important part as a causative factor. Barrow recently by a statistical comparison reported that the incidence of common colds at Stanford University in California is about the same as among the students at Cornell and Harvard Universities.

There is no perfect climate, but, according to Ward, an intermediate one is the best. In such a climate one can lead a vigorous out of door life practically the year round. A mild climate with low altitude and a high degree of atmospheric moisture tends to produce a more or less constant vaso-construction of the mucous membrane of the respiratory tract, thus preventing the mucosa from becoming excessively engorged

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

during an infection. This accounts for the milder types of infection seen in such a climate in comparison with those in the Northern states, where steam-heated houses are universal.

During the past year and a half there occurred in my private practice one hundred and eighty-three cases of sinus disease in children, of which surgery was necessary for a cure in eighty cases. The average age of the child was 7.5, and the proportion of males to females was 5 to 4. Ninety-two per cent were natives and 8 per cent were from the Eastern and North Central states. The incidence of season is important, there being 80 per cent during the three winter months. The mild winters we have permit a more out-of-door life, so we do not see the severe types of infection, yet an increasing number of the severe cases give a history of living in steam-heated houses. The school child is prone to have a more severe type of infection than the child who does not attend school. Comparatively few of the homes in our community are steam-heated, while all the schools are steam-heated. This makes it especially hard for the children to adapt themselves to the change.

I have not seen any case due to salt water swimming. As yet we have no artificial swimming pools so that source of infection has been eliminated.

I believe that the number of cases of sinus infection in children seen by the rhinologist in any locality is determined in a large measure by proving to the general practitioner and pediatrician that the condition does exist and in calling their attention to the most frequent symptoms so they can recognize the disease. Unless these cases are recognized and referred, the rhinologist will see very few of them and consequently will be led to believe that infection of the sinuses in children is a rare condition. Practically all of the cases seen by me were referred by a small group of physicians in my locality. Some cases were brought by the parents with the request that the sinuses be examined.

The conditions for which I was able to blame the sinus as a focus infection were a dry, unproductive cough, fever, asthma, nasal discharge lasting for several weeks or months, crusts in nares, sneezing, hoarseness and repeated attacks of otitis media. The most frequent complaint given was a persistent cough following each cold which lasted for weeks. Almost invariably the first attack was diagnosed whooping cough.

E. H., a girl age six, had had a persistent cough for four months with loss of weight and an elevation in temperature in the afternoon. Roentgenograms showed enlarged peribronchial glands with suggestive areas in lungs. The tonsils and adenoids had been removed one year previously. An examination revealed both maxillary sinuses infected. An antrumotomy followed by suction treatment relieved her cough. Six months later, during an acute corryza, a polypus springing from inside of the left maxillary sinus was seen under the inferior turbinate and was removed. The patient has remained in good health since then.

B. C., a boy age seven, was referred by Dr. Caraway for examination for a focus infection in the upper respiratory tract to account for a temperature of 103° of two weeks' duration without apparent cause. An examination revealed large infected tonsils and adenoids. A thick muco-purlent discharge was seen in the post-nasal space. The roentgenograms showed both maxillary and ethmoid sinuses cloudy. At the time of removal of the tonsils and adenoids a bi-lateral antrumotomy was done after the method advocated by Shea. The temperature returned to normal in a few days and the child has not had any recurrence of trouble.

That a change of climate does play an important part in the treatment is proven by the fact that cases of sinus disease in children sent to the coast from the Northern section of the Country improve rapidly without further treatment as a rule. If the case is a severe one, the symptoms are milder and the child is much more comfortable. Drainage is facilitated by the open air life with plenty of sunshine. Proper diet is also an important factor in treatment. Dean states that 80 per cent of his cases are cured by treatments and the removal of the diseased tonsils and adenoids.

Eighty-five per cent of the cases seen by me had diseased tonsils and adenoids, so this accounts for the higher percentage of sinus operations than is usually done. Only three cases required any radical procedure other than opening and draining the maxillary sinuses. In these cases ethmoid exenterations were done with removal of polypi for the relief of asthma. All cases suggestive of sinus infection are investigated by irrigation following the technic of Dean. An antrumotomy is done at the time of tonsillectomy, if pus or a muco-purulent discharge is found to be present, since it is my experience that very few of these cases yield to treatment without an antrumotomy. The procedure takes but a few minutes, and I have had only one complication resulting from the combined operation. This case required nasal packing to control a persistent bleeding. It is important to explain to the parents just what is done when the sinuses are operated upon so they will continue to keep up the necessary treatments each time the child has an acute infectious process of the upper respiratory tract. The parents usually think

the diseased sinus is removed like the tonsils and adenoids and consequently can never be reinfected.

The incidence of sinus disease in children along the Gulf Coast is higher than we formerly supposed. This increase is due no doubt to our improved method of diagnosis and education of the general practitioner and laity that such a disease exists. A few years ago we overlooked most of these cases. Unless every child is examined for sinus infection, no matter what the symptoms are, many cases will be overlooked. It is better to discover a sinus infection before the tonsils and adenoids are removed than afterward.

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Discussion follows paper of Dr. Heitger, page 622.

RELATION OF INFLAMMATION OF MAXILLARY SINUS TO THAT OF NOSE AND OTHER PARANASAL SINUSES*

By JOSEPH D. HEITGER, A.B., M.D.,
Louisville, Ky.

Observers of nasal sinus inflammation concur in the opinion that the maxillary sinus is more frequently involved than the other paranasal sinuses. Continued investigations in recent years have not only added to this view, but have also necessitated a reconsideration of the relation of maxillary sinus inflammation to involvement of the other nasal accessory sinuses, especially the ethmoid. A more accurate understanding of antrum pathology, coupled with a more careful analysis of the role played by the blood supply of the paranasal cells, have been the chief factors responsible for this reconsideration.

The blood supply of the nasal mucous membrane is derived largely from three arterial systems, namely, the sphenopalatine of the internal maxillary artery, the anterior nasal of the facial, and the two ethmoidal arteries, anterior and posterior, of the ophthalmic artery. The ramifications of the sphenopalatine artery extend from the choanae to the vestibule of the nose, and are not confined to the mucous membrane of the nose but also supply the nasal sinuses. The sphenopalatine and ethmoidal systems are more important than the nasal branch of the facial. Their clinical importance will be considered in greater detail later. Their anatomy is depicted in the illustrations and lantern slides.

Zuckerkandl first demonstrated that the turbinate bodies present a variation in the structure of the mucous membrane covering them. The mucous membrane covering the convexity and lower edge of the middle turbinate is of much firmer and tighter consistency than on its concavity. The mucous membrane covering the concavity of the middle turbinate, the ethmoid capsule, middle meatus and uncinate process is of a much thinner and looser structure. This is of great importance in the pathology of nasal polypi.

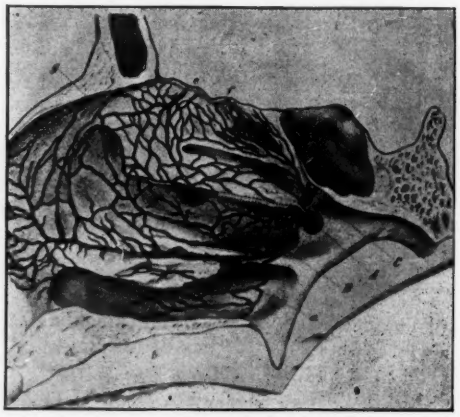

Fig. 1

Lateral wall of right nasal cavity with its arteries. (A) Posterior nasal or sphenopalatine artery; (B) a branch of same to the middle turbinate: this vessel divides at the posterior end of the turbinate into three branches, which run forward along the upper and lower edges and middle of the turbinate, and here and there extend into the bony furrows; (C) nasopalatine artery with branch for the superior turbinate; (e and g) branches of the anterior ethmoidal artery; (f) connection of posterior nasal with the posterior ethmoidal artery; (a and b) branches of the posterior nasal artery to the inferior meatus; (D) branches of the sphenopalatine artery in the vestibule of the nose; they anastomose with branches of the facial artery; (c c c) branch of the sphenopalatine artery to the middle turbinate; (d e f) branch of the nasopalatine artery to the superior turbinate; with the chief branches of the sphenopalatine artery the accompanying veins are to be seen.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

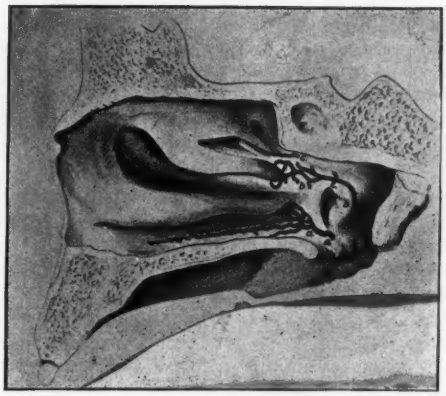

Fig. 2
Lateral wall of right nasal cavity with the posterior venous drainage. (a) Veins of inferior turbinate; (b) veins of middle turbinate; (c) veins of superior turbinate; (d) horizontally-placed venous branches of the inferior meatus.

Hajek describes the middle turbinate as an anatomical entity, or "involucrum," because of the difficulty in differentiating the layers of mucous membrane, connective tissue, periosteum, and bone. He classifies its inflammatory changes as follows: (1) surface inflammation involving the superficial layers of the mucous membrane; (2) deep inflammation affecting the soft parts between the bony trabeculae; and (3) a bone involvement type affecting the whole "involucrum," including mucous membrane, periosteum, bone and medullary substance. Pathological changes in this latter form include appositional or hyperplastic ostitis with the development of new osteoid tissue, the result of overnutrition from congestion, staining red to orange-red with hemalaun-eosin (old bone stains blue) and rarefying ostitis, a result of undernutrition from constriction of blood vessels by contracting connecting tissue. Appositional and rarefying ostitis have nothing to do with polypi formation which is the typical product of chronic inflammation of the ethmoid. All are the result of a general inflammatory affection of the ethmoid. Polyp formation is an expression of inflammation of the mucous membrane and is different from involvement of the medullary substance or bone. Where the mucous membrane is thin, as previously described, the ethmoid reacts to chronic inflammation by polyposis, and where it is thick, a compact, firmer hypertrophy occurs.

Hajek has repeatedly observed that inflammation of the ethmoid begins as a surface process and extends into the deeper tissues, and at no time has the reverse process been observed.

Polypi, as a rule, originate around the openings leading into the sinuses. Isolated polypi are not observed so frequently as those from the openings of the sinuses. Such an isolated polyp may be removed with its bony insertion and a cure usually results. Stasis with resulting edema increases the growth of polypi around the openings of the nasal sinuses. Kinking of the veins increases the edema as the polyp grows in size. When such a polyp is severed, the edematous origin inside the cell is not removed as in the case of the solitary polyp and recurrence results.

According to Hajek, there exist one purulent and three non-purulent causes of recurrence of nasal polypi. The former consists of pus in the sinus which irritates the lining membrane and produces polypi at the opening of the nasal sinus. Considering the non-purulent causes, first, the middle turbinate may exert a constricting effect on superficial polypi on the ethmoidal capsule, external ethmoiditis; second, polypi may recur from the membrane inside the sinuses as already described; and, finally, they may recur even after the membrane has been removed as a result of involvement of the bony trabeculae and medullary substance beyond the mucous membrane.

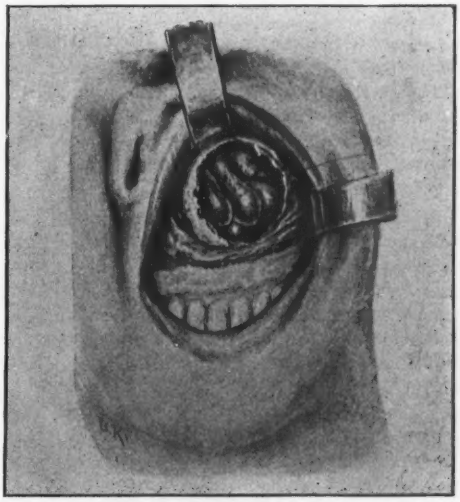

Fig. 3
Chronic catarrhal inflammation of maxillary sinus. The cavity is filled with edematous polypi. This type occurs in the majority of cases.

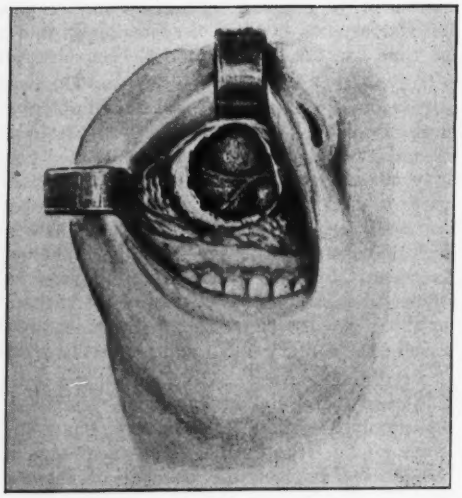

Fig. 4

Chronic catarrhal inflammation of the maxillary sinus. The mucous membrane forms a tent-like elevation filled with edematous fluid, which continues as a cord-like structure. This type occurs in the majority of cases.

O. Hirsch has shown that polypi in the middle and superior meatus bear the same relationship to catarrhal disease of the sinuses emptying therein as does the appearance of pus in these regions to suppurative disease of the two groups of sinuses. The purulent and catarrhal types of nasal sinus disease are subject to the same laws. Edema is an expression of a lesser degree of inflammation than is present in purulent disease. Like the purulent type, catarrhal inflammation is most frequently observed in the antrum, then less frequently in the frontal, ethmoid and sphenoid in the order named.

Catarrhal, like purulent disease, may be combined and can produce recurrence after an antrum operation. One may remove the membrane of the maxillary antrum, but non-recurrence of polypi cannot be assured. If there is a recurrence, the frontal, ethmoid and sphenoid must be examined and eliminated as etiological factors.

Formerly when polypi were present in the middle meatus, with a negative antrum puncture, ethmoid disease was diagnosed and the ethmoid cells opened. When polypi recurred, the responsibility was credited to poor operative technic and re-operations were done.

Hirsch has demonstrated that many such cases recurred because catarrhal disease of the antrum was overlooked. He studied a number of choanal polyp cases following an epidemic of influenza. He opened the antra in these cases and found edema of the lining membrane with polyp formation of two general types. These are depicted in the illustrations. He also found a type with a polyp growing from the floor of the antrum. Such a stalk could not grow upward to the antral opening and he interpreted its formation as follows: the whole lining of the antrum was inflamed at one time during an acute inflammatory attack and a part became incarcerated at the sinus opening. The inflammation subsided, but the stalk was carried to the floor because of incarceration at the opening. The mechanism is well shown in the accompanying drawing made for me by Hirsch during the past summer.

Hirsch considered that since the membrane was thus incarcerated other polypi could develop in the same way. He selected for study a number of cases presenting recurring polypi of the middle meatus with negative antrum puncture and explored the antrum. All showed a very marked edema of the lining mucous membrane. He investigated the literature and found

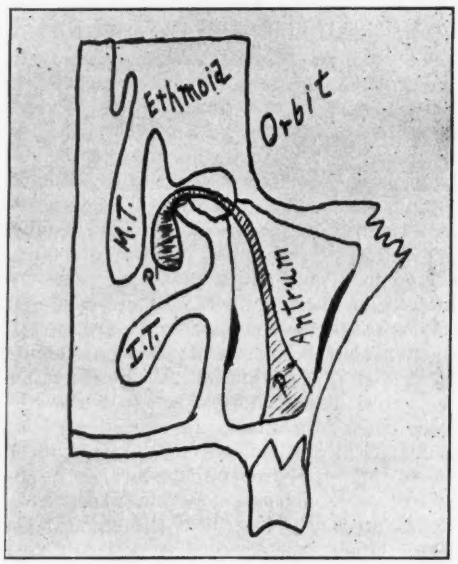

Fig. 5

Diagram illustrating incarceration of mucous membrane of maxillary antrum with resulting formation of nasal polypi.

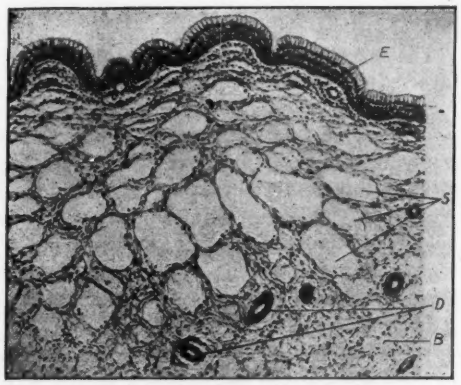

Fig. 6

Chronic edema of mucous membrane of maxillary sinus (magnifed forty-two times). From Hajek. (E) Ciliated epithelium; (S) connective tissue spaces filled with serum; (D) glands; (B) new-formed connective tissue rich in cells.

that Zuckerkandl had described the same condition, but had not given it the proper interpretation (Normale and pathologische anatomie der Nasenhohle, Band I, 297).

Zuckerkandl has shown that polypi may be in the middle meatus with the ethmoid clear. Hirsch accordingly claims that polypi occur in the middle meatus and on the external surface of the ethmoid cells, because the path of the disease outward from the antrum lies past the ethmoid. He also states that 70 per cent of the origins of polypi have been overlooked because 70 per cent arise from the antrum. Not all chronic catarrhal diseases of the antrum form polypi. These are the latent cases. He further states that these cases of recurring polypi may also result from ethmoid and frontal involvement, but his main contention is that the majority are due to antral disease.

That the ethmoid is not so often affected in suppurative and catarrhal disease we can explain by the blood supply. All the nasal sinuses, the maxillary, frontal, sphenoid and ethmoid, are supplied by ramifications of the sphenopalatine artery and are interposed in this blood supply system. When a patient contracts a coryza alterations occur in the vessels of the nasal cavity. These changes may extend into the sinuses mentioned. The ethmoid is only to a small degree interposed in this sphenopalatine artery system, as it receives the greater part of its blood supply from the anterior and posterior ethmoidal arteries. Therefore, with a coryza or influenza the ethmoid is less involved, only its superficial covering being affected by the circulatory changes mentioned.

Zuckerkandl describes these changes as "superficial ethmoiditis."

The maxillary antrum on the contrary receives most of its blood supply from the sphenopalatine system which enters the antrum through the natural and accessory openings when the latter are present. When the antral mucous membrane becomes edematous and diseased, it may act as a foreign body, losing its function, and require removal, because its blood supply cannot be restored and because of its irritating influence on the mucous membrane of the nose and the other nasal sinuses.

As a result of this variation in blood supply, we find both suppurative and catarrhal disease of the ethmoid less frequently than corresponding disease of the antrum.

This arrangement of the blood supply also accounts for the fact that polypi are found much more frequently on the surface of the ethmoid than in its interior.

The polypi arising on the surface of the ethmoid, which Hajek attributes to the loose structure of its mucous membrane, are classified by Hirsch as primary polypi with a tendency to recur, in contrast to the recurring type which he designates as secondary polypi. These re-

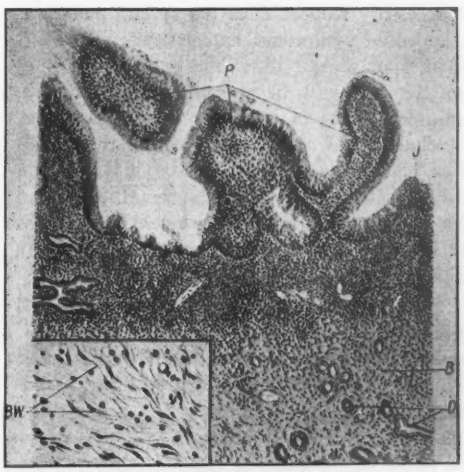

Fig 7

Chronic empyema of the maxillary sinus (magnified thirty-six times). From Hajek. (P) Papillae; (J) small celled infiltration; (B) connective tissue; (D) glands. Left below: detail of B magnified one hundred and ten times. (BW) Connective tissue proliferation.

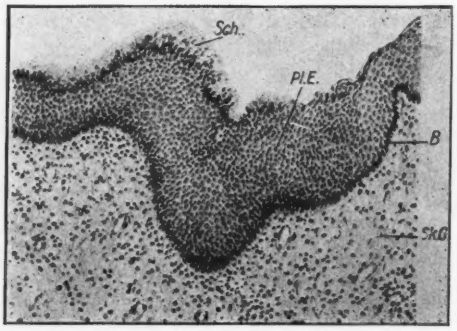

Fig. 8

Chronic empyema of the maxillary sinus with epithelial metaplasia (magnified seventy-five times). From Hajek. (Pl.E.) Stratified pavement epithelium; (Sch.) mucous membrane; (B) basal cell layer; (Sk.G.) sclerosed tissue.

curring or secondary polypi develop in two ways, namely, by prolapse into the nose of the mucous membrane of the nasal sinuses, especially the antrum, or by extension into the nose of a catarrhal inflammation of the accessory sinuses again, especially the antrum. The primary polypi exist in the minority of cases, whereas the secondary polypi are found in the majority. Most observers agree that suppuration with polyp formation is a secondary complication.

In the diagnosis of catarrhal inflammation of the accessory sinuses there are several outstanding objective symptoms, namely, recurring nasal polypi, spontaneous discharge of a serous fluid from the nose with or without needle puncture, rhinitis vasomotoria, negative antrum puncture, and clouding of the sinuses in the roentgenogram. Not all cases of catarrhal inflammation of the nasal sinuses, especially the antrum, lead to polyp formation. These are the latent cases and may require exploration before an accurate diagnosis can be made.

Exploration of the antrum is best accomplished through the canine fossa, as the catarrhal inflammation of this sinus is usually associated with bone resorption, although histological examination has failed to show the presence of osteoclasts.

A more careful study of the maxillary antrum as outlined in the foregoing remarks will in many obscure and recurring cases of nasal abnormality lead to more accurate diagnosis with better therapeutic results for the patient.

CONCLUSIONS

The maxillary antrum is the most frequently involved of all the nasal sinuses.

Polypi in the meati bear the same relation to chronic catarrhal disease of the sinuses emptying therein as the presence of pus in these areas to suppurative sinus disease.

Secondary or recurring polypi are more frequently encountered than the primary type.

Recurring polypi with negative results from antrum puncture may indicate chronic catarrhal inflammation of the antrum.

Recurring polypi are the objective symptom of chronic catarrhal inflammation of the accessory sinuses and suggest involvement of the antrum or other nasal sinuses.

The most frequent point of origin of recurring polypi lies in the antrum and not as was formerly considered in the ethmoid.

Polypi are present in the ethmoid capsule, because the pathway from the antrum leads past the ethmoid.

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DISCUSSION (Abstract)

Papers of Dr. Gill, Dr. McWilliams and Dr. Heitger

Dr. Harris P. Mosher, Boston, Mass.—From specimens in my possession I feel that the majority of pedunculated polyps which arise in the antrum spring from the region about the ostium, not from the floor. The statement at the conclusion of the paper that the antrum is the most frequently involved of all the sinuses is very old knowledge, although, perhaps, the fact will bear repeating.

I wish that someone would rise with strength enough to get away from the old term "catarrhal." It is a blot on our pathological terminology.

I am an admirer of Dr. Dean, but I cannot, probably due to lack of technic, find the number of cases of sinus disease in children which he finds.

I have long had the feeling that if the epidemiology of sinus disease were worked out a marked difference in its incidence in different parts of the country would show not only in children but in adults, and the speaker seemed to bring that out in his paper. In the discussion of sinus disease in children, it is often forgotten

that when there is an acute infection of the nose, there is also an infection of the sinuses. The two clear up together. Many of the cases of sinus disease in children are of this acute type and they should not properly be called sinus cases.

Dr. Gill reported six operated cases of frontal sinus disease. He began by saying that too little time had elapsed since operation to draw conclusions. He repeated this statement at the end of his paper. This is the truest and most important statement in the whole paper. You cannot draw conclusions from so few cases and from cases reported so soon. From a series of a hundred cases you can learn something.

I agree with the essayist in the use of the post-nasal plug. I use it as a routine. But I insist that it shall be introduced by sight, well greased. It should not be jammed blindly into place with the finger. I agree again in what was said about the care of the periosteum over the frontal sinus. It should be stripped up as little as possible beyond the limits of the bone opening to be made in the front wall of the sinus. I like to make a vertical incision in the periosteum so that I can elevate it in two flaps. Less tearing of the periosteum results. It is good practice to suture the periosteum, and this is easy to do if the periosteum has not been torn.

Dr. Gill said that it was hard to keep an opening from the frontal sinus into the nose. It is, especially if a small opening is made, and that opening is confined to the region of the naso-frontal duct. Such openings are notorious for closing. He said further that it was easy to obliterate the frontal sinus. I disagree emphatically. You can obliterate the region about the naso-frontal duct, but it is very hard to obliterate the off corners of the sinus and to be sure that there are no pockets left.

I would summarize my present stand on the radical frontal sinus operation in this way:

In the case of a small or orbital frontal sinus, the best procedure, I believe, is to remove all of the front wall and to obliterate the cavity of the sinus. Such a sinus is not difficult to obliterate. If, however, the sinus is of the large type and extends well above the rim of the orbit, I have given up the typical Killian operation, which removes all of the front wall above the bridge and pushes the skin and subcutaneous tissues against the back wall of the sinus and accomplishes obliteration as far as it is anatomically possible. In my hands this operation is the operation of last resort, because its use leaves so much deformity, especially in large sinuses. I have used for years what I call the modified Killian. The modification consists in removing only enough of the front wall of the sinus to permit the removal of septa and the diseased mucous membrane. A sinus so treated is not obliterated except in the off corners. It results in a scar tissue cavity which communicates freely in the nose. There is very little deformity. Such an operation is successful in about 75 per cent of cases. I remove the floor of the sinus as far as it is anatomically possible. My failures in radical operations on the frontal sinus, and the failures which I have seen, have been due to failure to remove enough of the floor of the sinus or to a failure to recognize and deal with a fronto-ethmoidal cell in series with the sinus.

Dr. Lynch, as you know, has given up the opening in the front wall of large sinuses for fear of osteomyelitis. He confines himself to a thorough removal of the floor, combined with a more extensive removal of the posterior ethmoidal cells. Up to two years ago I had never had osteomyelitis as a complication of frontal sinus operations. Since that time there have been five cases in the hospital with which I am connected. Three patients came to the hospital with osteomyelitis already complicating disease of the sinus, and two developed osteomyelitis after operation on the sinus. One of the five cases recovered after multiple operations. The others died, also after multiple operations. At the present time, therefore, I am a bit nervous about my accustomed opening in the front wall of the sinus. I disagree with Dr. Lynch on one point, namely, that it is possible in all cases completely to remove diseased mucous membrane from a frontal sinus from below and without an opening in the front wall. This does not seem to me possible. It may be that time will show that it is not essential (this has happened with the radical operation on the antrum) to remove all the diseased mucous membrane if the floor is completely removed and fronto-ethmoidal cells are recognized and properly dealt with. However, I should still like to have the privilege of making an opening in the front wall at my best discretion. The work of Dr. Lynch on the frontal sinus has put us all under great obligation to him.

Dr. John T. Crebbin, New Orleans, La.—The frontal sinus operation is not a new one, for the ancients successfully operated upon cases and evidently cured quite a few.

Many methods have been devised since Killian first submitted his operation, and the fact remains that we have not improved greatly upon his recommendations.

The greater number of operators prefer the intra-nasal operation. Naturally we should recognize the fact that there are exceptions when only the radical operation is indicated.

Owing to the anatomical location of the frontal sinus, intra-nasal operations offer great encouragement, because if ventilation and drainage are secured the average case will be cured.

Too much stress cannot be laid on the ability of a rhinologist to interpret his own plates.

I thoroughly agree with Dr. Mosher in sounding a warning against the unnecessary destruction of the periosteum.

The essayist has wisely stressed that there should be little or no after-treatment. I have found that this is a very safe rule to follow.

Doubtless Dr. Dean, in Iowa City, sees more sinus cases in children than we do, because he looks for them, and because his climate is subject to severe and sudden changes. We do not see the same number in the South. However, we come in contact with many cases. When children have a cold, with sneezing and blowing, it may mean a sinus involvement. We should educate not only the public but the family physician to observe the cases more carefully, to prevent suffering and future complications.

When washing out the maxillary sinus, if a black or blue basin is used instead of the usual white one, a discharge may be noted, which would be overlooked in a white basin.

Dr. John H. Foster, Houston, Tex.—I am one of those who still believe in the efficiency of intra-nasal drainage of chronic frontal sinusitis, except in cases where there are definite indications for an external operation. Even if a small amount of drainage per-

sists, I am not sure that we are justified in doing a radical operation unless there be other indications. As the author has pointed out, a serious objection to intra-nasal operations has been the tendency of the fronto-nasal ducts to close. This is particularly true where much of the mucous membrane has been removed with rasps. However, if the technic of Halle is followed, a good opening will persist, and many very chronic cases will clear up. Thus fewer will close than following the general run of radical operations.

I see no decided advantage in the technic for obliteration of the sinus outlined in Dr. Gill's paper. The feature stressed by the writer is the obliteration of the sinus by pressure. I do not believe it is possible by pressure to obliterate the space next to the septum in a small, deep sinus. The author says the Killian operation alone is applicable in large sinuses. I believe that the operation devised by our Chairman is the most satisfactory one we have. My results with it have been better than with any other radical operation I have used, and I have tried most of them. It is the only operation by which I have been able to remove the ethmoid cells thoroughly in their orbital extension, and I believe that these cells are responsible for more of the recurrences than anything else. If the sinus is thoroughly cleaned out and the ethmoid cells are entirely removed, it makes little difference if the intra-nasal opening closes later. I have not observed any undesirable cosmetic effects from sinking in of the orbital tissues following this operation, or any other disagreeable after-effects, aside from a transient diplopia. Of course, my experience with the operation is limited and I reserve the right to change my mind later.

Dr. Arthur K. Hoge, Wheeling, W. Va.—Dr. Gill's paper is typical of a number of manuscripts which have been read before our special societies in the past few years by those representing the radical school of sinus surgery. There has been a marked reaction against this radicalism even by those who first advocated the procedures. In the clinics of Austria and Germany the pendulum has already swung from extreme radicalism to more conservatism. It behooves us to exhaust the simpler methods of treatment at our command before we resort to the more serious procedures.

A short time ago while studying under Hajek in Vienna I heard him make a plea for more conservative surgery of the sinuses. He cited a case of chronic frontal sinusitis which had come under his observation a number of years ago. This case was carefully studied, and it was decided that an external frontal sinus operation was indicated. He then did a preliminary amputation of the anterior third of the middle turbinate on the affected side under local anesthesia, intending to wait until this healed and then do the external operation. The operation was scheduled but the patient did not return. A few years later he again saw the patient who was suffering from another condition. To his surprise he found that the chronic frontal sinusitis had entirely cleared up and the patient was free from symptoms. He asked from whom the patient had had further treatments and the patient replied: "Doctor, you cured me."

Hajek stated that this was not the history of the occasional case but was found to be true in a very large percentage of those where conservative treatment was instituted. His plan is to attempt to re-establish ventilation and drainage by the simpler methods. If the septum be deflected so that it interferes with ventilation and drainage, first straighten it. If the middle turbinate be at fault, refract it, or remove its anterior third. After waiting a reasonable length of time, if the condition still persists, clean out the anterior ethmoids and enlarge the naso-frontal duct. Only after these measures have failed should an external frontal operation be considered.

Skillern states in acute frontal sinus infections 95 per cent is a conservative estimate of the number of cases that will clear up after such simple procedures as refracting the middle turbinate or removing its anterior end. Since chronic frontal sinus infection is the result of an acute inflammation which has not cleared up, why would it not be good logic to apply the same rules before resorting to an operation which leaves at least some deformity?

We practice in the upper Ohio River Valley, where sinus infection is very prevalent, owing to climatic conditions. My two associates and I see large numbers of chronic frontal sinus infections. By conservative measures we are able to clear up the greater percentage of our cases, and we do not average more than one external operation in eighteen months.

Let us now consider the case histories offered by the author:

Case 1.—A child 15 years of age had pain of three days' duration over his right eye, was associated with swelling of the right upper lid, and temperature of 105°. There was no history of previous sinus infection. External frontal sinus operation advised and undertaken. The operation was not completed, as his condition was bad. Erysipelas of ten days' duration developed. The next complication was an acute exacerbation of a chronic ear, requiring a radical mastoid operation. No intra-nasal findings are noted. What are our deductions from data furnished by the author?

(1) This case was not one of chronic frontal sinusitis, but an acute infection.

(2) In such an early stage of acute frontal sinusitis we do not believe any surgery is warranted. Medicinal shrinkage of the nasal mucous membrane and active elimination should have been tried.

(3) By operating in the acute stage the life of this boy was jeopardized by an acute erysipelatous infection.

(4) The post-nasal packing required in the operation probably was the main etiological factor in the development of his acute exacerbation of a chronic ear and of the subsequent radical mastoid operation. This again endangered his life.

(5) The author states that in spite of the fact that he was unable to complete the operation, the sinus completely healed and has remained well for the past eighteen months. Had the drainage been established by more conservative measures, would not the end result have been the same?

Case 3.—A boy 19 years of age gave a history of frontal sinus infection in March, 1923, of two weeks' duration. Another attack in March, 1924, lasted two weeks, and still another in March, 1925, lasted five weeks. There was very little pain during any of these attacks and no nasal discharge. The present illness began about four weeks before. There arises in our mind a very serious doubt as to whether this case presents a chronic frontal sinusitis. Seldom is a chronic involvement seen without nasal discharge at some time. How were the previous diagnoses made? In our opinion this was probably a recurrent frontal sinus infection, no doubt due to deficient ventilation and drain-

age, possibly caused by the effects of an acute rhinitis upon a narrow naso-frontal duct or a tight middle turbinate. If this had happened to be a recurrent acute suppurative otitis media with its associate acute mastoiditis coming on about the same time each year and lasting two or three weeks, would any one think of doing a mastoidectomy, or would he think of making an incision of the drum and then after the symptoms had cleared up, doing an adenoidectomy, to try to promote better ventilation and drainage?

Case 5.—A man of 40 years had had pain in the left eye for the previous week. The upper lid was red and swollen. Two days after the case was first seen a radical operation was undertaken. This case also has the earmarks of an acute infection. No surgery is indicated in an acute case of short duration, unless medicinal shrinkage and suction have been employed or unless symptoms of some complications develop.

Chronic frontal sinus infections are not of idiopathic origin, but always follow an acute infection. The principal factors in the diagnosis are:

(1) History of previous acute infection.

(2) Pain, mild or severe in character.

(3) Nasal discharge.

(4) Rhinological findings (anatomical and pathological).

(5) Pathological conditions demonstrated by x-ray.

The x-ray findings are of value only when considered with the other findings. The author apparently has depended upon x-ray interpretation for diagnosis and has ignored the clinical side of the cases. To our mind he has utterly failed to prove that dependence can be made on the x-ray findings alone.

There are three schools of rhinologists:

(1) Those who are ultra radical.

(2) Those who are too timid to attempt surgery, and are the so-called "spray doctors."

(3) The third class are those who strike a happy medium, first using conservative treatment until it is proven futile, then resorting to and performing surgery as radical as may be indicated by the findings. According to the histories given by the author with the lack of any anatomical or pathological findings other than the shadow found on the x-ray plate, we feel that in at least three out of five of the cases presented radical surgery was done which was ill-advised and in no wise indicated.

Dr. John J. Shea, Memphis, Tenn.—Since sinusitis is usually a progressive disease, in the paper presented by Dr. Heitger, we have to take into consideration what phase of the sinus infection we are studying before considering what proportion of the sinuses are involved. In the chronic cases the maxillary sinuses are most frequently involved, but in the acute cases we do not know, especially in children, which sinus is most often affected. We have been able to study three hundred and twenty-one cases that were referred for sinus treatment, and we made a tabulation as to which sinus was the predominating one. After going over the cases very carefully, we were unable to come to a conclusion as to whether the ethmoidal cases predominated or the maxillary. But I am sure that in the chronic cases the maxillary predominates, and in these cases the treatment should be a complete procedure. I do not like to speak of "radicals;" I would rather use "complete operation," and a complete operation on the maxillaries certainly gives the best results, and therefore it is apparent that the point of greatest abnormality in chronic sinus disease is the maxillary sinus.

In sinus disease in children, we have been following our cases very closely to note the influence of tonsillectomy on the causation. I am beginning to feel that early and indiscriminate removal of tonsils in children precipitates sinus disease. My opinion is that the tonsil acts as an immunizing body for the individual When it is removed, something must take on this immunizing function, and perhaps the sinuses do it. In these three hundred and twenty-one cases referred for sinus disease by the pediatrician, the majority had their tonsils removed before the fifth year. In watching these cases it became evident that a number of the children had colds and their tonsils had been taken out previously, and then the next year the same child had sinus infection: not simply rhinitis but a cold that lasted six or eight weeks, during which time the child lost weight. Dr. Dean has found that treatment in these cases will clear most of them up, but he includes in his treatment irrigation of the sinuses. His treatment differs from ours in that in making his opening he gives the patient ethyl gas and washes out the antrum. In our experience we have found it sufficient merely to make an opening and put in a little tube and wash it out for five or six days. That does not interfere with the child and in a case of persistent infantile type we have shown that the sinuses take on new growth. If we did any damage, certainly that new growth would stop, but the fact that they continue to grow is an indication of the result.

Referring to Dr. Gills' paper, I was struck, as was Dr. Hoge, by the fact that he was doing radicals in acute cases. His experience certainly does not correspond to ours. At the American Medical Association meeting last year in Dallas in a paper I presented before the Section, I tried to bring out the fact that in acute frontal cases we should first try intra-nasal surgery, and then, if we fail to relieve them, make a little opening as if for a frontal, but put in a tube and drain it, and do no radical surgery as long as the acute symptoms are present.

For the past eighteen months we have done our radical frontals under local anesthesia. There is an absence of bleeding and a perfectly clean field, and it is like doing a radical antrum under a local. We can do so much more thorough work, and we have had better results after radicals under local than we have had under general, because we have been able to do our work to better advantage.

I have never before in a medical meeting heard a man get up and retract anything he ever said on the floor. Only a man of Dr. Mosher's caliber would do it. At the Triological meeting in St. Louis, Dr. Mosher expressed himself about this matter. Now he has changed his mind, and is willing to say so. We have had two referred cases of frontal sinus osteomyelitis in the past two years, both of which looked very much like extradural abscess. By a very extensive operation at the hands of a brain surgeon in our town, both of these cases were saved, but it was necessary to remove the whole anterior wall of the frontal bone.

Dr. Thomas W. Moore, Huntington, W. Va.—We have all had trouble in the interpretation of the x-ray, but I have been able to eliminate it to a large extent by having the same x-ray man all the time. He sends the picture to me with his diagnosis, and I put my own interpretation on it. Since I have done this I am getting more satisfactory results from x-ray pictures.

Dr. Gill also spoke about the small opening in the frontal. If you cannot explore the sinus, you have your rongeur, so make the opening as large as necessary. There is no necessity for limiting this in any way. It is essential to explore the entire sinus and remove all the diseased tissue therein.

I cannot understand why Dr. Lynch and Dr. Mosher find it necessary to remove the entire floor of the frontal sinus. There are exceptional cases where it is necessary, but it is only in a small percentage of cases that you must remove the entire orbital floor. If a patient comes in with a preliminary diagnosis of chronic sinusitis, a patient treated intra-nasally, but who has a recurrence every year, you, of course, must do something else, but if you give him free drainage and remove the diseased tissue you have done all that is necessary usually. If the patient is free from trouble from three to five years, have you not accomplished what you expected? It is necessary in only a few cases to remove the entire floor.

I have never found it necessary to use a drainage tube. The patients recover more rapidly without a drainage tube, which acts as a foreign body. If you make a good opening, you do not need a tube. Let it drain through the nose, which is the proper place for the frontal sinus to drain.

Dr. Heitger's paper is to me revolutionary. I have always felt that nasal polypi were due to repeated infection of the ethmoid capsule. Going hurriedly over our records, we have been unable to find a single patient upon whom we had done a radical antrum operation who returned to have polyps removed. I feel that Dr. Heitger is on the right track, and that many cases of recurrent polypi are kept up solely by the infection in the antrum. This has been one of my reasons for operating upon the ethmoids, that the patient did have recurring polyps.

Dr. Millard F. Arbuckle, St. Louis, Mo.—I feel that recurrence of nasal polypi very often is the result of a continuation of maxillary suppuration. Sir St. Clair Thompson says post-mortem examination of sinuses following an epidemic of so-called "flu" have disclosed the fact that the sphenoid sinus is more often involved than any of the others. I believe that sinus suppuration spreads from one sinus to another by contiguity Long standing suppuration causes changes in the bone and in the soft tissues which interfere with the blood supply. I have had occasion recently to see some microscopic sections of bones from cases of sinus suppuration in which peri-arterial infiltration was very extensive, and the narrowing of the lumen of the vessels correspondingly great. The blood supply, of course, was interfered with in proportion to the narrowing of the lumen of the vessels.

For chronic suppurative disease with polyp formation, the best treatment is a radical operation on the maxillary sinus.

For some years now I have done my maxillary and other nasal operations with twilight and local anesthesia, including radical frontal sinus operations. I do not use a post-nasal plug, for the reason that I do not need it.

Surgery of any sort is contra-indicated in the presence of acute inflammatory processes in the sinuses. A radical frontal sinus operation should be undertaken only after all other methods have failed. By other methods, I mean comprehensive intra-nasal surgery, including the removal of that part of the naso-frontal duct which comes away with a high cut of the middle turbinate. A considerable amount of time, several months in many cases, should then be allowed to elapse to see if they do not get well.

My best results in frontal sinus operations has been with the so-called Lynch operation. Several years ago I saw Dr. Lynch do this operation. I began to use it and have had no reason to change my method. Most of the floor of the sinus should be removed and the duct enlarged forward and toward the midline as much as possible. I have in a few cases used a skin graft and I find it works nicely. In one case there was an exfoliation of the skin, showing that it had apparently filled up the sinus with epithelium. It was cleaned out and the patient apparently was entirely well after two or three years. The skin undoubtedly took, because in this case we arranged to see what happened. On closing the wound, we had sewed a piece of rubber tissue into the edge of the wound, so that on removing the stitches the wound opened up and we could see that the skin covered the walls of the sinus like white enamel.

It is important for the rhinologist to be able to interpret his own plates. They should be well made. I study plates of practically all sinus cases in my own x-ray department. The plates are made with the same position of the head, and with practically the same density, and we have been very much gratified and surprised to see how much additional information we could obtain by this method.

Dr. Rufus J. Pearson, Miami, Fla.—Our mild climate gives us an advantage that some of you do not have in the treatment of sinus diseases.

I agree with the gentleman who said that the first thing to do was to straighten the septum and remove the anterior third of the middle turbinate and do whatever other minor work may be found necessary in the nose in order to facilitate drainage. In addition, we usually give these patients sprays, or more often nasal syphons, for home use, which may not have a physiological effect but at least have a psychological value.

Dr. Homer Dupuy, New Orleans, La.—About ten years ago I enjoyed the privilege of presenting a contribution before this Section on the question of the relation of the maxillary sinuses to troubles above it. In other words, instead of regarding the maxillary sinus as the cause of trouble higher up, I brought up the subject of the maxillary sinus as a reservoir.

When we have an obscure x-ray picture, and when it is difficult to say, intra-nasally, whether we are dealing with a sphenoidal, a frontal or an ethmoidal suppuration, and with all the evidence strongly in the direction of the maxillary sinus, we are inclined to accept a case as a primary maxillary sinusitis and operate accordingly. Remember that the maxillary sinus frequently plays the role of a reservoir, and the reason we fail surgically to relieve the trouble is that we have ignored the upper and posterior sinus involvement.

Dr. Arthur I. Weil, New Orleans, La.—Every one on the floor has stressed the necessity of conservatism in the treatment of sinuses, especially the chronic frontal. I think we are all agreed on that, but I wish to emphasize the great benefit of doing a simple submucous resection in these cases of frontal sinus disease. We ought to straighten the septum without even taking off the anterior two-thirds of the middle turbinate, and when we straighten the septum and give the sinuses a chance to drain, very often the infection will disappear.

The removal of the anterior wall of the frontal sinus,

as described by Dr. Gill, is all right, except for the deformity; but I do not see how we can remove the anterior wall of the frontal sinus and obliterate the sinus through that wall without causing marked deformity.

Sinus disease in children we do not see very frequently, and they recover quickly with slight treatment. One essayist spoke of the use of suction with children. They are not amenable to treatment of that sort, and it is a difficult procedure. We have been in the habit of washing the antrum in all cases where there were suggestive signs in children, and it has been my experience to find sinus trouble comparatively rarely. I was disappointed after reading Dr. Dean's contribution, because while I have found some cases of infected sinuses in children I certainly have not found the antrum involved in many cases.

I have heard the theory of the maxillary sinus as a reservoir, and I believed it for a while, but in the past few years I am beginning to believe less and less in the theory of the maxillary sinus as a cess pool. I believe it is the cause rather than the result of infection in the other sinuses. We repeatedly do simple washing, without radical procedure, without opening into the canine fossa, and the pathological condition has completely disappeared.

One important thing brought out by Dr. Crebbin was the use of a dark basin in washing out the antrum. That was brought forcibly to my attention when we moved our clinic a few years ago, and the old black bowl we used to use was lost. I was so struck with the small percentage of positive results in antrum washings with the white bowl that I painted the bowl black and found that the number of cases in which I got positive results had increased. Many antrum infections are slight. They show a low grade infection where there is not a large amount of pus, but more mucus, and washing them into the white basin we did not see it, whereas with the black basin you do see even a small amount of pus and are able to make a diagnosis.

Dr. R. G. Reeves, Knoxville, Tenn.—For treating very young children and washing out their noses, I have an apparatus that can be used in children even one year old. This is a glass tube containing another glass tube (illustrating on blackboard the Lare suction tip).

You would be surprised in a case of acute sinusitis at what you can wash out of the nose. The children are treated this way perhaps several times, and a number of them clear up. I do not believe it will be necessary to operate upon many cases if this method of treatment is used.

The question is raised whether we shall do the more conservative or the radical operation. Dr. Mosher is one of my former teachers and with him I agree in doing a radical operation when it is necessary. A radical frontal is something I seldom do, although I do a lot of sinus work. Recently I have proven to myself that I can get results by operating upon the antrum intra-nasally rather than through the canine fossa. If I could not get results intra-nasally, I should do a radical operation.

Dr. W. Likely Simpson, Memphis, Tenn.—In a series of a little over one hundred external operations on the sinuses we have had eight or nine acute cases in which we did an incision with drainage, and in two or three of these cases it was necessary later to do a complete radical operation. It is possible to treat only those cases of pansinusitis with large supraorbital ethmoids and very large sinuses by an external operation.

As to optic neuritis in a case of partial or complete blindness from posterior ethmoid or sphenoid trouble, the external operation is far better and safer than an intra-nasal operation.

In the last three years my associate, Dr. Robin Harris and I have done over fifty external radical ethmo-frontal operations under local anesthesia. Before that, we did more under general anesthesia, using a post-nasal plug. We have never done one of these operations without a post-nasal plug. The operation is much easier under local anesthesia than under general. We use morphin and atropin, or morphin and scopolamin, before operation. The field of operation is injected with 0.5 per cent novocain. With the novocain we use a small amount of adrenalin. It is unusual for us to tie more than two or three vessels. We use a single catgut suture subcutaneously in the region of the pulley. I do not remember a single subcutaneous abscess since we stopped the use of catgut subcutaneous suture and the ligation of so many vessels as was necessary under general anesthesia.

Dr. Robert C. Lynch, New Orleans, La.—The operation described by Dr. Gill differs greatly from my own. My idea about his procedure is that it is all wrong. In the very small sinuses, as was brought out by Dr. Mosher in his discussion, this procedure would be in order. In fact, in the very small sinuses it seems to be practically necessary to do an operation of the kind which Dr. Gill describes. However, in the larger sinuses, and certainly in those cases where there is opportunity of recurrence of the lesion and for secondary complications, this procedure is not indicated. We have observed four cases of osteomyelitis which developed after an operative technic similar to the one described. Some of them were in my own hands and some in the hands of Dr. Gordon King, my predecessor. It was this that started us on the road to find another method. The obliteration of the cavity seemed to be complete, but the patient came back, and the records show that that patient was operated upon eight or ten times, and only came to a recovery that was reasonably fair after an entirely different type of procedure.

After all else has failed, try this technic. Only after all else has failed should we consider the technic of the frontal sinus in order. Unless the pathological condition is perfectly apparent after painstaking examination and history taking, observation of the nose and x-ray pictures, and everything else that will throw light on this situation, a radical frontal should not be considered. But if such a case is thoroughly chronic, I cannot understand how tissue which has so changed in its type as no longer to resemble the mucous membrane, and no longer to function as mucous membrane, can be brought back by drainage which, it has been shown, cannot be maintained over a satisfactory period of time.

One man said drainage can be maintained two or three hours, but it cannot be maintained. In my hands, at least, drainage through the nose from a sinus, where the histology of the mucous membrane has changed, alone will not bring that pathological membrane back to normal, and if it does not, then the patient is not well.

It has been my experience that we differ very much in our interpretation of the cure of these cases. In

many of them drainage is established at first and then there is some stoppage and not infrequently a damming back in the sinus, and they suffer from pain and they have a nose full of pus. They have a certain amount of absorption which apparently is not in proportion to the amount of involvement of mucous membrane, and yet since they do not complain of pain and are not violently sick, they are considered cured. Many cases have come to me in such a situation as this who have been discharged from other offices as cured. Such a patient is not a cured sinus case.

I stand by the technic that has given me the best results and which I have described. Removing the entire floor has been followed by recurrence, and lifting up the periosteum on the frontal wall has been followed by the development of osteomyelitis. In my experience with one hundred and twenty-two cases, I have found no necessity for making a window opening, whether it is square or round, or any other shape, in the frontal plate of the frontal bone, for the purpose of more completely taking out the frontal sinus.

Second, I would like to say that in none of the cases in which the operative procedure which I described takes place is the frontal sinus alone involved. I have never seen such a situation as is described in Dr. Gill's paper, a pure, simple chronic frontal sinus involved by itself, without ethmoidal, antral or sphenoidal involvement. In my opinion, it does not exist. If you are going to operate upon a case from that standpoint, the operation must include total evacuation of the ethmoid and as much evacuation as can be done on the sphenoid. I do not wish to shirk any work, but I certainly attack with fear and trembling the evacuation of a sphenoid. Now and then I have accomplished it when it had not developed anatomically beyond what I thought was the limit for safety. The antrum, as was brought out in the article, must be done first if you are going to cure the rest of the sinuses. The antrum in practically all of our cases we find in a more or less inflammatory condition. An inflammatory process which is chronic has existed for years, and which exhibits marked pathological changes, is not confined to the ethmoids and sphenoids alone, or to this whole group without involving the antrum. To get rid of all of the infection, we start at the bottom and clean out the antrum. Cleaning out the antrum and the lower group of ethmoid cells which can be reached by the antral route frequently is sufficient to clear up the condition. If so, that is all that is done. The nose is clean, there is no more pus, the patient has no more symptoms, and in our estimation is well. If that is not accomplished, that patient must be submitted to a radical operation which takes in the frontal, ethmoids and sphenoids, and when that operation is started, it is started with the idea that the group shall be treated as one area, and it is only since we have standardized ourselves on these two important points, that we have acquired results which can be regarded as satisfactory in this class of cases. The whole operation came because of the clinic at the Eye, Ear, Nose and Throat Hospital in New Orleans. These patients crowded the clinic, and we could not get them well until we developed this operation.

Dr. Gill (closing).—The title of my paper was "The Surgical Treatment of Chronic Frontal Sinusitis." I did not give complete histories of all my cases, for I was not giving the differential diagnosis of acute and chronic frontal sinusitis. I did not think anyone would suppose that a radical operation had been done for relief of acute frontal sinusitis. A suggestion of this kind is absurd and ridiculous. Suffice it to say that the cases reported were ones of chronic infection of the frontal sinus.

As to the deformity, the cases presented spoke for themselves. We all realize there is difference of opinion regarding the removal of the floor of the frontal sinus. Some competent operators remove the floor and some do not. Both groups report what good results follow their respective technics.

As to the criticism of the number of cases reported, I will answer that by saying that Dr. T. W. Moore reported a similar number of cases, describing his technic before this Section ten years ago. Lothrop, when describing the technic of his operation before the American Medical Association in 1915, reported only seventeen cases, and Dr. R. C. Lynch described the technic of his operation before the American Triological in June, 1920, stating that he had performed the operation in fifteen consecutive cases. In reviewing the discussion of these papers, I found that there was no adverse criticism as to the limited number of cases reported. Consequently I feel that the discussants' criticism of my limited number of cases is unwarranted.

Dr. Heitger (closing).—I tried to make it clear from the lantern slide that the polyp shown was just one example of how such a polyp may have its attachment in the floor of the antrum. When the mucous membrane lining the antrum becomes greatly swollen, it may become incarcerated at the opening of the antrum, and when the swelling of the mucous membrane subsides a stalk is carried back to any part of the antrum. That, of course, depends upon what part of the swollen membrane becomes incarcerated at the antrum opening.

I quite agree with Dr. Mosher in regard to the use of the word "catarrhal," and since he resides in the environment of one of our most celebrated seats of learning I would suggest that he and his confreres coin us a suitable term to substitute for the word "catarrhal." I am sure all of us would be very glad to accept it.

In the cases of recurring polypi which I described, antrum puncture was always negative, so evidently the reservoir of which Dr. Dupuy spoke was empty at the beginning, and his statements would have no application in the type of cases to which I referred.

DIAGNOSIS AND TREATMENT OF THYMUS DISEASE*

By JOHN D. MACRAE, M.D.,
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The value of the x-ray in the management of enlarged thymus is not fully appreciated, though it has generally been discussed among pediatricians and radiologists. The relief gained in thymus disease by x-ray treatments is so spectacular that the known facts should be more widely disseminated in the profession.

Enlargement of this organ was given as the

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cause of thymic asthma nearly one hundred years ago, and the opinion was expressed that its increased size was responsible for the symptoms by reason of pressure on the trachea.

The space in the upper thorax in which the trachea, gullet, blood vessels, nerves, heart and thymus are enclosed is well filled by them, and as a consequence moderate enlargement of the thymus will cause pressure and distress.

It had been shown that a large part of the gland could be removed without harmful effect on the patient. Therefore, surgical removal was practiced, lifting the gland and stitching it to the tissues higher up in the neck, and also resection of the manubrium was done. While these surgical procedures cured some cases, they were attended with great mortality.

It has been suggested that when the gland is over-active the blood is charged with an excess of thymus secretion. This condition was called status thymicus; and its symptoms dyspnea, stridor and convulsions were the result of constitutional poisoning, a state comparable with hyperthyroidism rather than local pressure.

The status lymphaticus, where all the lymphatic tissues of the body tend toward hypertrophy, is said to be accompanied by thymus enlargement. This is sometimes true but not always.

Status thymicus, so called, seems to me to be a group of pressure symptoms rather than a constitutional state.

Young animals on whom thymectomy has been done become fat, flabby and stupid. Their bones are small and lacking in calcium. These animals die in convulsions. From this we conclude that complete destruction of the thymus in early infancy must not be done and that x-ray treatments must be controlled in order to avoid this disaster.

Normally the thymus gland undergoes atrophy and ceases to function before the end of the third year, and it is needless to observe this precaution so closely as that time approaches.

The need for x-ray examination is suggested by a few characteristic symptoms which generally occur in very young infants. The pathological thymus occasionally persists after the third year so that some cases occur later in childhood.

The pediatrician recognizes certain symptoms which indicate that the thymus is enlarged, and he seeks confirmation of the diagnosis at the hands of the radiologist. The radiologist has generally drawn his conclusions about the enlarged thymus from a group of selected cases. He has found enlargement in most cases when it was suspected; but a small percentage of cases present all the symptoms of thymus disease when no enlargement is demonstrated. On the other hand, studies of normal infants have been made which show that many cases of enlarged thymus exist with no signs of disease.

When x-ray treatments are given infants with thymic hypertrophy, or with symptoms and no demonstrable enlargement, the gland is seen to become much smaller within a few days. The symptoms are relieved often before reduction is demonstrated in the size of the gland. The other group of cases with symptoms and no enlargement are also relieved.

From these observations and the fact that most men x-ray their patients in the anteroposterior position, it seems that considerable lateral enlargement may exist without causing distress and that the hypertrophy from before backward is that which causes trouble. This is not often recognized with x-rays, because lateral films of the chest for this condition are hard to interpret and are not generally made.

In radiography of the infant, chest speed is absolutely necessary in order to stop motion. Position is important, and the desired position must be maintained by the help of assistants. Some radiologists have the baby held erect with its chest to the film and others favor the horizontal position, either breast or back, to the film. Either position will give good results if the tube is properly centered, and there is no rotation of the body. I find it easier to control the subject lying supine and have adopted this position. Two films are made, one while the lungs are filled with air just when the subject has inhaled deeply before crying, and the other at the end of the cry when the lungs are deflated as much as possible.

Stereoscopy is rarely practicable and is attempted only occasionally. I have not tried lateral films with success. Some radiologists have, and point to evidences of pressure indenting the trachea anteriorly and producing some degree of stenosis. I shall carry on with this method, trying to acquire some skill in its use. It ought to be very helpful.

The thymus is represented by a shadow superimposed on the arch of the aorta and extending down to spread over the auricles, more noticeable

on the left. The question of enlargement is hard to settle, for it is the antero-posterior hypertrophy that causes distress, and this may exist without lateral extension. There is great variation within normal limits.

Dr. Wasson feels that a thymus which is nearly three times as broad as the dorsal vertebrae behind it is pathological.

Nothing in radiotherapy is more startling than the relief which follows x-ray treatments in thymus disease. I have seen infants almost suffocating, unable to nurse, and seemingly about to die, get relief, breathe easily, nurse and sleep within twelve hours after a treatment. All cases are not relieved so promptly, but I have never treated a case of thymic hypertrophy without benefiting or curing it.

I treated my first cases of enlarged thymus about twelve years ago with larger doses than I use now. Early in my experience with this condition, I saw several cases experience relief coincident with the x-ray exposure used in making the chest plates. I was not using instantaneous exposures then. At that time I gave a massive dose once a month and repeated it several times after relief was obtained as a precaution against return of the enlargement.

Treatment now is administered once a week for a month with the following factors: 5 milliamperes, 8-inch spark gap, 1 millimeter of aluminum filter, 10-inch distance, 1.5 minutes exposure to the anterior chest and the same posteriorly.

It is rarely ever necessary to repeat such a series or to give any further treatment.

In conclusion, x-rays are of the utmost value in diagnosis and treatment of enlarged thymus. This is well known among pediatricians and radiologists, but there is need for a wider dissemination of this knowledge among physicians.

DISCUSSION (Abstract)

Dr. Clyde C. Phillips, Charlotte, N. C.—If we treat these children with an enlarged thymus early, we can cure 100 per cent.

The question has arisen as to what constitutes an enlarged thymus. In a number of children we see a thymus shadow which is much larger than the average and which is, so far as we can determine, causing no trouble. In other children we can demonstrate no enlargement, and the child has definite symptoms of thymus disease and when treated with the x-ray recovers. The question that arises in my mind is, if we see a child with a thymus which is considerably larger than normal who is having no symptoms from this condition, should that child be treated? I go ahead and treat them. I do not believe it does the child any harm, but whether it does any good I do not know. I treat them, because children die very suddenly from attacks of thymus disease, even before we have time to get them to the x-ray department, or before anyone can reach them with radium. We feel safe in treating them when the child has a gland that is larger than the average. As to what causes the symptoms in thymus disease, I frankly confess I do not know. I have some opinions about it which I shall state.

I cannot subscribe very much to the theory that pressure causes the symptoms, because I have seen markedly enlarged thymus glands which were causing no symptoms and small glands which were causing very decided symptoms. Further than that, if the symptoms are caused by pressure from the size of the gland, why does the patient make such a prompt recovery before the gland has atrophied? It seems to me, then, that the symptoms are caused by oversecretion.

I should just like to ask Dr. MacRae if he knows at what age the animals that had the thymus removed died and at what age their symptoms developed. Probably we are overtreating these little fellows and they may have trouble in later life, even though they get along very well immediately after treatment.

Dr. Charles J. Bloom, New Orleans, La.—I am glad to hear Dr. MacRae say we cannot standardize the size of the thymus. In some cases in our series after the condition has been diagnosed clinically, we have been rather surprised to find how small the thymus was from the lateral view. But these cases and some cases that have come to post-mortem in other services sometimes will have a small sinus projecting through the superior thoracic inlet, producing rather marked symptoms in contrast to a thymus that is apparently very large and without symptoms.

We have encouraged in New Orleans the procedure of sending practically every one of our children who for any reason may be operated upon to have a picture of the thymus.

As to exactly what produces the thymus symptoms, I believe, like the second speaker, that the size does not always influence the symptoms. The cases which have cyanosis are not the more serious cases. A very pale child who becomes paler and clammy gives us great trouble. These are, I believe, the cases that require larger doses of x-ray.

Dr. W. R. Bethea, Memphis, Tenn.—The thymus region should always be investigated when radiographic study is being made to determine the cause of spastic vomiting in children.

Dr. MacRae (closing).—The question of the effect of the pressure exerted by the thymus is not settled in my mind. While I believe it to be the main cause of the symptoms, I should be glad to have more light on the subject.

The thymectomized dogs were young dogs, and they lived several months. I feel that x-ray treatment is the therapeutic test, for there is no tissue in the body of a very young child more susceptible to x-ray influence than the thymus.

In regard to pre-operative treatment, I was very glad that Dr. Bloom spoke of the position of the pediatricians in New Orleans.

It is better to give x-ray treatment to the patient with an enlarged thymus if the child is to be operated upon and take an anesthetic than it is to leave off the treatment and let the child go to operation without x-ray treatment.

ACUTE POLIOMYELITIS*

By R. M. POLLITZER, M.D.,
Greenville, S. C.

Although poliomyelitis was known in this country since 1843, the epidemics were small and attracted little attention before the outbreak in Vermont in 1894. It was not until the marked increase in incidence and severity in Scandinavia in 1905, with the very extensive epidemic in New York in 1907, that the disease received much notice in the scientific world. There were during that summer of 1907 at least two thousand and five hundred cases in New York City and the vicinity. Since then at no time has America been free from this pestilence, though its sites have shifted from coast to coast. Within the past fifteen years every state in the Union has been invaded.

From its first mention by Underwood in 1787 under the appellation, "Debility of the Lower Extremity," it has been masquerading under a variety of names which have in some measure interfered with a proper appreciation of its true nature. Badham, in England in 1835, tried to arouse medical interest in it, but it was not until 1909 that Landsteiner and Popper by successfully inoculating a monkey inaugurated the scientific era. Their work was rapidly corroborated and extended by Flexner and Lewis and shortly after by many others in America, Germany and Italy.

We know, today, that the disease is due to a filter-passing virus which is almost ultra-microscopic; that it increases in virulence after invading each host, and later on weakening, it dies. It is resistant to chemicals, cold and drying. And of great importance is our knowledge that its avenue of ingress and egress in man is the upper respiratory tract. Lucas and others have shown that it may remain there for months and years, a danger to others, even though the carrier himself escapes. As far as we know, the affected, the abortive cases, and the carriers are the only agents in spreading poliomyelitis. The epidemic of 1916 in the United States which spent its force chiefly in New York and Massachusetts by its magnitude and high relative mortality stimulated clinicians and research workers to a high degree. In New York City there were over nine thousand cases. The United States Census had previously reported in the Registration Area over five thousand deaths between 1910 and 1914. But in 1916 alone, from June to November, in the same territory the deaths amounted to six thousand. As in this, most epidemics occur in summer or early fall. Exceptionally, as has been pointed out by Leake, there are small and mild ones in winter.

There is no question that the disease is contagious, but its infectivity is low, being one-fifth that of scarlet fever. The communicable period is in all three weeks. In the New York epidemic of 1916, of over eight thousand families involved only 4 per cent contributed more than one case. However, these figures may well be questioned since undoubtedly many abortive cases escape recognition. A paralytic case occurs only when the natural defense of the nervous system is overcome.

SYMPTOMATOLOGY

Inasmuch as the clinical picture in this disease depends not only on the virulence and resistance as in other infections, but differs markedly according to the involvement or non-involvement of the nervous system; and further upon what portion of it is attacked, we are not surprised that there is a marked variation in the symptom-complex. The onset may be rapid, gradual or interrupted. There may be no paralysis, but a temporary mental disturbance ranging from irritability to coma. There may be muscle tremors or convulsions. The preliminary systemic disturbance may be exhibited by the respiratory or the digestive system.

In general, fever is the first symptom (98 per cent of cases), followed by irritability, lassitude or drowsiness, with some alternating apprehension and muscle pains. There is no appetite. Nearly always there is some stiffness of the neck, and later of the spine. Vomiting is common. Diarrhea especially in infants is the rule, but there may be constipation. Sweating of the head is frequent. Many individuals show considerable redness of the fauces and some few have tonsillitis. A nasal cold is extremely common. In the pre-paralytic period the malady

"is much like that of any other acute infection, so far as the general symptoms of temperature, malaise and prostration are concerned. In addition to these, however, there are certain somewhat more specific characteristics. These are peculiar nervous irritability and a resentfulness."

Far too much attention has been centered on the paralysis, which, while important to the patient and the surgeon, are really but results of

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the attack of the virus on the nervous system, and inform us that it is already too late to institute specific therapy. The paralysis often seems sudden, but there is some preliminary muscle weakness. In a series of seven hundred cases, in 71 per cent it ensued before the fourth day. Over 60 per cent occur within the first three days. Most often one leg is affected, next both legs, and then the back. But any group or single muscle may be involved.

The most usual form of the disease is the spinal type in which there is fairly rapid paralysis with slight increase for a day or two and then in a few weeks some remission with considerable improvement within six months. With persistent skilled orthopedic treatment, complete restoration of function occurs in about one-fourth. The paralysis is of the flaccid type with some atrophy. Where the intercostals and the diaphragm are put out of commission, death ensues. The encephalitic type is not common, but adds difficulties to the diagnosis. It, of course, produces a spastic paralysis. The abortive form is rarely seen except in a time of epidemic, as no paralysis ensues. During epidemics 40 to 60 per cent of the cases fall into this category (Amoss).

Unless one has seen a large series of cases, his conception of the dissimilarity of the cases, and yet their possession of certain fundamental characteristics is by no means clear, nor can one readily portray the main clinical features without citing case histories. The following are abstracted from my personal records:

Case 1.—J. W., a boy of eleven years, was seen in consultation July 16, 1925. His family and past history are unimportant. For several days he had complained of headache and had diarrhea. At the initial visit, his temperature was 103°; he then had headache and some stiffness of the neck. Spinal puncture was done, and the fluid was found to be under pressure, to have 74 cells per cm., mostly lymphocytes, and some globulin. Three days later there was no fever and he seemed well. A week later there was noted a slight dragging of the foot, which disappeared in about a week.

Case 2.—R. J., a girl of five years, who was well, robust and very bright, suddenly on June 7, 1925, complained of headache and nausea. She vomited. The illness was called "biliousness" by the parents and so treated. The next day there was no longer nausea, but pain was felt in the left leg and foot. The following day the physician was summoned because of her partial loss of use of the left leg. That evening, when I saw her, her mental condition was good, she objected greatly to being handled, and there was a slight weakness in the lower left leg. Fever lasted from June 7 to 12. By June 12 the paralysis had extended. Gradual convalescence set in on June 15. On June 17 all pain had gone, the whole lower leg was paralyzed, and the upper very weak. Subsequently she walked with a brace.

Case 3.—T. S., a boy of two years, suddenly became ill with high fever on July 14. At that time, also, he vomited and was extremely nervous. On July 18 it was observed that the whole left leg was paralyzed. Then the fever subsided. He was seen by me on July 27 when he was no longer ill, but had complete paralysis. No spinal puncture was done and no specific treatment instituted. On September 1 paralysis had not diminished.

Case 4.—W. H., a girl in a large family had previously been in good health. The family and past history are of no importance here. She suddenly became ill with fever and severe headache on July 23, 1925. The regular family physician was called on the first day. He found her with a temperature of 102.5°, with a stiff neck, and in bed. She was bright, talked, and even laughed. There was no paralysis. Late that afternoon she walked about. The next day she was languid, less cheerful, and complained of pain in the lower back on the right side. Urination being frequent, a specimen was examined, which contained albumin and pus. On that basis, a diagnosis of pyelitis was made.

At night she became unable to talk, the temperature was high, and she was delirious. The next morning she was conscious and quiet, but still unable to talk. The temperature was 103°. No skeletal paralysis was noted. She was seen that afternoon (July 25) in consultation. A complete paralysis of the extremities, neck and back was found. Also she could neither talk nor swallow, but was conscious. Almost clear spinal fluid was allowed to escape by its own pressure. It was found to contain 118 cells, some globulin, much albumin, some sugar and no organisms. That night respiration became rapid and she died early the next day.

These four cases, which exhibit only some of the characteristics of the disease, at least serve to point out the essential features. The consultant is rarely called early enough to be of the greatest service.

DIAGNOSIS

The diagnosis is based on the history, the spinal fluid findings, and to a lesser extent the physical examination. The age is of some bearing. In the New York City epidemic of 1916, 83 per cent of cases were under five years and 90 per cent under ten. The history as a rule separates poliomyelitis from other affections that involve the nervous system, and is quite dissimilar from that of tuberculous meningitis. The spinal fluid examination, while by no means sufficient in itself, is of great help. The findings vary, of course, according to the stage of the disease, the severity and the kind of treatment. In general, there is an increase of cells to 25, 50 or 100, and less often to 500, or even 1,000, or more. They are lymphocytic, often including many large mononuclears. No organisms are present. The fluid is as a rule almost clear and under moderately increased pressure. The albumin and globulin are always increased and the latter persists for weeks. Prior to paralysis,

even just as soon as the virus has passed the barrier of the chorioid plexus, there will be found spinal fluid changes. Hence its importance in diagnosis. In the pre-paralytic stage we have an ill patient who presents suggestive nervous manifestations. As Draper has written,

"Any patient who presents an unexplained febrile disturbance and shows nervous irritability with tenderness on flexion of the spine should have a spinal puncture."

Of course, there are many similar and some few rather dissimilar diseases to be differentiated. We must consider meningismus, tuberculous meningitis, encephalitis which sometimes is part of the disease; typhoid, especially in babies, and on superficial examination, even rickets, scurvy and syphilitic epiphysitis may cause some confusion.

I have known the last to be mistaken for poliomyelitis more than once. Diphtheritic neuritis, too, may require differentiation. Trauma may be perplexing. If the history and the physical examination are carefully obtained, however, aside from meningitis, meningismus, and encephalitis, there need be little difficulty. Laboratory examination, aside from that of the spinal fluid, is of no help. The blood findings are of no value; the urinary likewise. The neutralization test is not only impracticable but too slow. The precipitin test of Rosenow, even if specific, does not help in the diagnosis, as in his series 72 per cent of controls within the epidemic area were positive. Rosenow's skin reaction, which is too recently developed to evaluate, is only a test for susceptiblity and furnishes no aid in time of illness. After paralysis the diagnosis is usually very simple, but we know that the disease must be recognized before this happens.

PROGNOSIS

The foretelling of the result as to life or limb in any particular case is never safe. In general a patient may be expected to survive the illness, to have permanently some muscular disability, but to make marked improvement. In many instances a high cell count in the spinal fluid is an index of severity. The mortality varies greatly with time and place. In New York City in 1915, it was 26 per cent, while in Boston it was 8 per cent. The death rate is highest under one year, and next highest in those over ten years. The mortality among adults is highest. All cases with respiratory paralysis that I have seen died. Sporadic cases have a low mortality. Where death occurs, it is usually in the first week, and most often on the third or fourth day. The percentage of individuals who are fortunate in having complete restoration of function ranges from 16 to 44 per cent. "The first six months show the greatest improvement; after this, progress is slow."

TREATMENT

The subject of treatment is best divided into that of the acute, the convalescent and the chronic stage. The last is of concern to the orthopedist and will not be attempted here. In the convalescent stage the aim should be to keep the patient at rest and comfortable, while preventing deformities. Weeks or months should pass before massage, manipulation or electricity is applied. In the acute stage, which embraces the whole period during which there are fever, pain and symptoms of nervous system involvement, we may treat the infection along general lines or administer a specific. Little need be said as to general treatment. The patient needs to be kept at rest, and if paralysis ensues, the affected part, or parts, should be protected and deformity prevented. Feeding after the first few days is necessary and at times a tube must be used. Spinal puncture aside from assisting in the establishment of the diagnosis relieves pressure and may need to be repeated once or oftener. Usually one puncture suffices. No drug is of any value in diminishing the injury to the nerve tissue. Adrenalin I have used without success in desperate cases.

When one asks whether there is any specific, his answer may be yes or no. If yes, he may be informed that convalescent serum is of great benefit, but must be used intraspinally. Another physician will say, never use it intraspinally but always intramuscularly; and a third will insist that the intraspinal and intravenous routes combined are best. All these replies, of course, if based on the literature, go back to several events.

"Flexner and Lewis first showed that monkeys that had recovered from the disease could not be reinfected, and that their blood had the power of neutralizing virus."

Netter, in 1912, treated a human case with convalescent serum, and in 1916 Amoss and Chesney treated twenty-six cases (intravenously and intraspinally) with convalescent serum. Their results were good. Later the New York Health Department did much work along this line. They concluded:

"The results obtained seemed to be favorable when the serum was used in suitable cases in the pre-paralytic

stage of the disease." Yet they also state: "The action of the serum may even be distinctly harmful."

A large number of physicians today have lost faith in the efficacy of convalescent serum. Dr. Josephine Neal, of the New York City Department of Health, in a personal communication of October 21, wrote:

"My observation of the cases treated by others has led me to have an unfavorable opinion regarding it." She adds: "If I had the disease myself, I should not want it used."

Peabody is inclined to believe that "no good case is made out for serum." Amoss, however, on analyzing his results, finds: "The progress of the disease is arrested in cases treated within forty-eight hours after the onset and with more than 50 c.c. of serum."

Draper still holds very positively to the opinion that convalescent serum is of great value, and that it must be given by vein and by the spinal canal (J. A. M. A., p. 995, Sept. 26, 1925). He asserts that

"Two things, therefore, are necessary for the successful prevention of paralysis by the use of serum from patients who have recovered. First of all, a pre-paralytic diagnosis must be made, and secondly, a sufficient amount of serum must be used both intraspinally and intravenously."

J. L. Morse, in his latest work, "Clinical Pediatrics," writes in regard to the use of serum: "I have never seen it to do any good." Many of the failures with serum have been attributed to its employment too late, or in too small a dose.

The most encouraging and convincing report in regard to the use of serum comes from Shaw, Thelander and Fleischner. It is true that some of their cases were unusual, but nevertheless the diagnosis stands. The obtaining of marked benefit, indeed, of complete recovery is striking, for several of their patients were severely ill. However, in no case had paralysis occurred. The serum was given intramuscularly, which is more practicable than intravenous injection, and less irritating than intraspinal. This account of five cases so treated appeared just a year ago. Since then Fleischner has cited others. If the findings of these men can be confirmed, we may be able to feel more optimistic.

In September, 1917, Rosenow published a preliminary report on the treatment of epidemic poliomyelitis with immune horse serum. Since then, numerous articles from him and his associates have appeared. There has been much argument pro and con as to its worth. The discussion has at times shifted from the results with antitoxin back to his etiological and experimental research. As Josephine Neal puts it:

"If the opinion of the majority of bacteriologists is correct that the organisms described by Rosenow are not the cause of poliomyelitis, the use of the serum has no scientific basis." Further, "Nothing that I have read in the literature has convinced me that it has any value."

Draper is most emphatically opposed to the use of the Rosenow serum. About a year ago in the *Journal of the American Medical Association* he stated:

"This serum (Rosenow's) does not neutralize a virus which is capable of producing the experimental disease in monkeys, nor has anyone ever produced infantile paralysis in monkeys with any streptococcus."

Rosenow admits his inability to infect monkeys, but explains this by stating that this "may be due to a relatively high natural immunity, as well as to the development of immunity." He claims that the pleomorphic streptococcus is the aerobic form of the globoid bodies of Flexner and Noguchi.

Rosenow and others have certainly had very favorable results following the use of the serum. The question arises here as in all therapy for poliomyelitis, whether the results were spontaneous or induced. Dr. Helmholz in a personal communication wrote:

"I know of nothing on which it is more difficult to express an opinion than the use of serum in the treatment of acute poliomyelitis. . . . I have had a number of cases in which very definitely it seemed to have prevented the paralytic stage, and in other cases reduced it to a minimum." He advises its use in all cases.

If one gives the Rosenow horse serum, it should be injected intramuscularly, never otherwise, and preferably before paralysis.

The question as to whether we have a specific therapy for acute poliomyelitis is one that must be left to the future. Were I, however, required to express an opinion, it would be in favor of the use of convalescent serum injected intramuscularly. In time we shall surely evolve some simple diagnostic test, a safe method of immunization and the demonstration beyond a doubt of the potency of a specific.

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DISCUSSION (Abstract)

Dr. W. L. Funkhouser, Atlanta, Ga.—We have been quite fortunate, I think, in Atlanta and Georgia in not having large numbers of cases of poliomyelitis recently. The term "I think" is used advisedly, in that I tried to find out accurately the number of cases we have had in Georgia during the last four or five years. Much to my humiliation, I found that the number of deaths exceeded the number of cases reported. However, the same condition exists in other states, even the states supposed to have the best vital statistic records.

We should report our cases of poliomyelitis, and all of our cases of infectious diseases, as carefully as we do our deaths. Of course, I realize that when we report deaths the undertaker is usually sitting in our office with a pink slip, and we very quickly sign the certificate to get him out of the reception room.

The New York epidemic of poliomyelitis upset many of our ideas as to symptomatology. We saw cases of a new type, especially the non-paralytic, which may show nothing more than some stiffness of the neck and increased pressure of the spinal fluid.

In therapy for this disease, we have nothing definite to offer, and views as to its method of spread are conflicting. The medical profession has no uniform instructions to give the public.

Dr. Philip Barbour, Louisville, Ky.—Early diagnosis and prognosis are extremely difficult in poliomyelitis of either the sporadic or epidemic form. After the paralysis has occurred, there should be no difficulty in understanding its cause, but it is not always easy to tell what the ultimate residue of damage will be. The epidemic type seems to be characterized by more sensory disturbance than the sporadic type; but both show a history of gastro-intestinal disturbance of more or less violence, which may run into the attack, or which may have been so mild as to have been unnoticed before the attack. One symptom is pain in the nucha. Little pain is elicited when the head is turned from side to side, but if the neck is brought down on the chest there is pain. This will occur before paralysis and should make us suspect the nature of the disease.

If a spinal puncture is made early, there is quite an increase in the cell count and in the polymorphonuclears. In two or three days the cell count decreases. Proportionally the polymorphonuclears are decreased and the lymphocytes are increased. There is no question that spinal punctures have been of value in relieving pressure in the spinal cord. This is as curative a measure as we possess.

It is difficult in the smaller cities to secure convalescent serum. Experience with this agent in the larger cities is considered rather favorable, but in the smaller cities the results have not been so good. Dr. Floyd Clark has reported several cases treated with Rosenow's serum in the pre-paralytic stage in which favorable results were obtained. My own experience with it in the recent epidemic in Louisville was not particularly encouraging. There were several cases in which it was used, in the pre-paralytic stage, which went on to rather extensive paralysis. But it is practically impossible in any case before paralysis occurs to give an accurate prognosis as to how much paralysis will occur, or whether it would have been more extensive if Rosenow's serum had not been used. Recent literature seems to be against the specificity of the serum. Many fulminating symptoms will practically disappear, while other cases with a mild limited paralysis will go on to complete paralysis and death, and we have as yet no way by which we can foretell the result of the infection.

Rest to the damaged nervous system is most important until the acute processes in the cord have ceased. Postures should be used of the paralyzed muscles to prevent stricture and deformities.

Dr. Stewart H. Welch, Birmingham, Ala.—I happened to be in New York in 1916 during the poliomyelitis epidemic and went into the Department of Health Hospital, North Brothers Island, as interne. We should accept as a part of our duty in the handling of these cases the prevention of deformity, and should use the simplest method to accomplish this end. The pediatrician should control the management of the case throughout the acute stage and at the end of this stage (six to eight weeks) turn over the case to the orthopedist with a minimum amount of deformity, or none at all. It may be necessary in some instances to associate the orthopedist earlier in the case in order more correctly to care for the involved muscle groups.

Dr. James W. Bruce, Louisville, Ky.—In a small poliomyelitis epidemic in Louisville just a year ago, there were forty-five cases, seven of which died.

The diagnosis should be made in the pre-paralytic stage, because only then can we hope to do much by treatment. Unfortunately many cases do not show enough spinal symptoms to warrant spinal puncture. Only the children showing spinal symptoms should be punctured. We cannot routinely puncture every child. In Louisville many cases had definite spinal signs, such as stiff neck and positive Kernig. It was only by examination of the spinal fluid that we could distinguish them from meningitis.

We followed the method of treatment outlined by Montgomery Cole several years ago of daily spinal puncture and drainage of as much fluid as would flow

freely. We punctured every day as long as the disease was progressing. As soon as the paralysis ceased to develop, we stopped. Rosenow's serum was not very useful in our hands. Of course, if you use Rosenow's serum you have to admit that the streptococcus is the cause of poliomyelitis, and that may be gravely doubted. Convalescent serum is difficult to find, and so I think that the daily puncture is the best method to follow.

One point not brought out is the use of hypertonic salt solution in respiratory paralysis. When the respiratory center is becoming involved, a hypertonic salt solution will relieve the congestion of the medulla and the patient's symptoms. In one of my cases I think it saved the patient's life. The child was dyspneic and became very apprehensive and nervous. Hypertonic salt solution was injected intravenously, and in the course of a few hours he began to have free diuresis, with relief of symptoms, and recovered.

In the New York epidemic 25 per cent died, 50 per cent recovered without paralysis, and 25 per cent with paralysis. For the prevention of deformities, I am glad to turn these cases over to the orthopedists as soon as they will take them. Most orthopedists advise leaving the patient alone during the acute stage, using simple splints to prevent contractures.

Dr. T. D. Walker, Jr., Macon, Ga.—I went through the New York epidemic, and had the misfortune of losing a little girl. After the epidemic was over, we carried on an epidemiological study, and found that the disease extended out from New York in proportion to the number of people that came into the city. The people who commuted into the city daily carried the disease back to the smaller towns adjacent to New York.

Every known remedy was tried without results. At the Rockefeller Institute after the epidemic was over, I was told that one hundred and twenty-six modifications of urotropin had been tried to make it more effective in the treatment of the disease, but without results.

All remedies have proven hopeless or problematical, but if I had a case at present I would try convalescent serum.

Dr. Pollitzer (closing).—I disagree with the gentlemen who advised repeated spinal punctures. I believe harm may be done by frequent puncture. One puncture is usually but not always necessary. Several punctures do harm by disturbing the child.

Antiseptics in the throat, prophylactically, I purposely did not discuss. They do harm sometimes by irritating the mucous membrane, thus causing a decrease of resistance.

I am glad Dr. Bruce brought out the use of hypertonic salt solution. I could find only two references to its use, but it is undoubtedly of value in desperate cases.

Discussion of prevention of deformities, I omitted for lack of time.

I have seen only one case recover in consequence of the use of serum. My feelings are in favor of convalescent serum rather than horse serum. This impression is from a study of the literature rather than from my own results.

BILIARY, PANCREATIC AND DUODENAL STUDIES IV. EFFECT OF ATROPINIZATION UPON EXTERNAL PANCREATIC ENZYMES IN MAN*

By LAY MARTIN, M.D.,
Baltimore, Md.

The clearness of the conception that one might gain from a cursory reading of the textbooks on the pancreas is quickly fogged in penetrating the history of the subject and delving even lightly into the literature.

We all agree that the pancreas is an organ which secretes digestive enzymes, trypsin, diastase and lipase into the duodenum via the duct of Wirsung. Its blood supply is well known, and the fact that it receives fibers from the vagus and the sympathetic is also common knowledge. As to why the pancreas behaves as it does, we know relatively little.

The micro-anatomy of the organ has been extensively studied by Bensley,[1] Saguchi[2] and Opie.[3] Recently Duffey[4] has made a study of the acini cells after thorough pilocarpinization and sacrifice of the animals in various stages of their pancreatic physiology; also a long treatise has been written by Ukai.[5]

The first serious study of the enzyme activities, secretion and action was done by Pavlov[6] and his school. They were responsible for the groundwork on which a great amount of investigation has since been done, practically all in animals.

Pavlov studied the pancreatic secretion by means of a permanent pancreatic fistula in the dog, and came to the conclusion that the vagus contained both secretory and inhibitory fibers to the pancreas. Electric stimulation of either vagus in the thorax, below the laryngeal and cardiac fibers, produced a pancreatic secretion after a latent period varying from fifteen seconds to two minutes. This delay he attributed to the inhibitory fibers in the nerves which must be tired out before the secretory effect could be obtained. He also showed that stimulation of the sympathetic would cause a slowing of the secretion already started by the vagus, and that compression of the thoracic aorta would always stop it in the course of a few seconds.

Mett later on showed that the stimulation of

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the second vagus, after the excitation of the first had produced a continuous secretion, would quickly stop all secretion. The inhibitory fibers contained in the other vagus were, of course, blamed for this. Popielski[7] advanced this theory by stating that after each vagus divided in the thorax into an anterior and posterior, before they again reunited in the diaphragm, he could isolate strands which were purely, motor or inhibitory. Anrep[8] in 1914 was entirely unable to repeat this work.

Atropin served a double purpose. Given before stimulation of the vagus, it prevented secretion; administered while the secretion was in progress, it caused a cessation or decrease of activity.

The Russian workers were also able to show that hydrochloric acid introduced into the duodenum was able to produce a marked pancreatic secretion which could be stopped or prevented by the timely dose of atropin. They were able to produce pancreatic secretion by other acids, by fats, gastric chyme, and by the same psychic stimulation that produced gastric secretion. In the last experiment their work was not well controlled, although they obtained pancreatic secretion in two to three minutes, whereas four to eight minutes is the latent period before which gastric juice is first seen in their sham feeding experiments. They also suggest that other materials than those mentioned above are responsible for the secretion of pancreatic enzymes. Witness the good digestion in achylia.

In 1902 Bayliss and Starling[9] carried all before them when they discovered secretin and advanced their hydrochloric acid, pro-secretin, secretin, hormone action, trypsinogen, enterokinase action. This held the field for years until gradually the consensus of opinion became divided as to the correctness of the hypothesis, and finally it became quite dubious. In the past year Mellanby and Hugget[10] have shown quite definitely that it is incorrect and that one must still look further.

With these two theories in the field, other types of evidence as to the physiology of the organ came into print. In France, Camus and Gley[11] produced work which tended to corroborate that of Bayliss and Starling. In a pancreas intubated dog secretion produced a pancreatic secretion whose trypsin was only active when activated by enterokinase. They furthermore found that the secretin-produced secretion could not be inhibited by atropin but that which was produced by pilocarpin could be markedly reduced. Shortly before this, Wertheimer and Lapage[12] demonstrated the fact that atropin could not prevent or inhibit that produced by 0.5 per cent solution of hydrochloric acid in 10 to 20 c.c. amount when the latter was injected into the duodenum. Wertheimer,[13] later corroborated by Bayliss and Starling, produced pancreatic secretion by injection of pilocarpin into isolated, denervated loops of intestine.

Francis-Frank and Hallion[14] approaching the problem by a different tract, and later Otto May[15] made plethysmographic tracings of the pancreas, using various types of stimuli. The French experimenters found a diminution in the size of the pancreas when the splanchnics were stimulated. May concluded from his work that

"The secretion resulting from the intravenous injection of secretion is accompanied by a well marked vaso-dilation of the pancreas. The vaso-dilation resulting from the intravenous injection of secretin appears to be secondary to the secretion. Probably the action of some katabolites in the vessels." And lastly that "there is no direct relationship between the rate of secretion of pancreatic juice and the extent of its blood supply; secretion continues for some time after complete cessation of the pancreatic circulation."

Morel and Terraine,[17] also working on dogs, concluded that the titratable alkalinity of the pancreatic juice diminished regularly in a prolonged secretion and that the lipolytic power decreased in the same proportion.

The polemic carried on in this country between Pemberton and Sweet[18] against E. W. Edmunds[19] brought out some interesting observations and the final conclusion that whereas their facts were more or less in accord, the interpretation of them was quite different.

The former workers held that the inhibiting action of adrenalin and pituitary extracts on the secretion of the pancreas was not related to the concomitant rise in blood pressure but to some specific ingredient of the extracts. Edmunds took exception to the supposition of this specificity; showed that nicotin and other drugs which cause vaso-constriction in the gland (determined by diminution in plethysmograph) cause an inhibition which is probably due to anemia of the pancreas. He feels, with Pavlov and Bernstein[20] that there is a very close relationship between blood supply and the activity of the gland. In his first article he shows that asphyxia and splanchnic stimulation, although they raise the blood pressure as high as adrenalin and nicotin, do not cause as much pancreatic inhibition as that brought about by the drugs.

"The most reasonable explanation which suggests itself is that the two drugs cause more constriction of the vessels of the pancreas than does splanchnic stimulation and thus greater anemia results from their use."

Von Anrep[21] in 1914 stated:

"If the peripheral end of the vagus be stimulated, the first stimulus is without effect. The next few stimulations usually give secretion but only after a very long latent period with repetition of the stimuli, the latent period gets steadily shorter so that finally the flow of juice may start within a few seconds of the commencement of stimulus."

The flow is at first jerky, and later on steady. This peculiarity of vagal stimulation was described by Pavlov and later confirmed by Kudreveski,[22] Mett[23] and Popielski, all working on decerebrate dogs. Von Anrep also felt that the vagus contained both secretory and inhibitory fibers, and was able to inhibit the secretin-produced secretion by moderate vagal stimulation. The secretory action of the vagus was paralyzed by small doses of atropin and the inhibitory by large ones. In a later article he produces plethysmographic tracings of a very interesting character that put the question on a different basis. In decerebrate dogs the initial stimulation of the pancreas causes a dilation of the gland which continues until the stimulus is removed and secretion sets in. If atropin has previously been given, there is no dilation on stimulation of the vagus and no secretion. He feels that the initial stimulus causes a constriction of the pancreatic ducts and that the concomitant secretion causes a dilation of the gland which only ceases when the ducts relax and the pancreatic juice pours forth into the duodenum. After atropin, even though the motor phenomenon is in action, the secretory activity is held in abeyance. Consequently there is no enlargement. He furthermore believes that there are no vaso-constrictor nor vaso-dilator fibers in the vagus. Korovitsky[24] working on cats confirmed this work.

Von Anrep,[25] working later on with Lush and Palmer, found in secretin-produced secretion, in chlorolose anesthetized dogs, a gradual and parallel decrease in the concentration of these enzymes. After a period of rest, the strength returned fully and was independent of atropin and section of vagi. They felt that the changes in concentration of enzymes depended upon the general condition of the animal and the blood supply to the gland.

Babkin[26] in 1925 reports that the section of the splanchnic nerves increases the secretion provoked by hydrochloric acid. A cessation of secretion is obtained by the following procedures: (a) stimulation of central stump or vagus in neck; (b) introduction of defibrinated blood, which produces a rise in blood pressure. The stimulation of the vagi below the heart will produce a secretion of pancreatic juice under extremely low blood pressure. He feels that:

"The pancreatic gland is extremely sensitive to anemia. Even an insignificant and short contraction of its blood vessels inhibits or in some cases stops the secretion. It is quite possible that in normal conditions the restriction of blood flow in the gland is one of the means by which the secretion is inhibited. On the other hand, the congestion of blood in the abdominal viscera not only does not disturb the pancreatic secretion but to a certain degree assists it. The fall of blood pressure, which is connected with the increased filling of the abdominal vessels, is favorable to the humoral as well as the nervous secretion of the pancreatic juice."

Quite recently Mellanby,[27] working on dogs stimulated with secretin, reports a parallel decrease in enzyme activity with a constant level of titratable alkalies. This can be returned to its normal onset strength by rest or pilocarpin; but he does find that section of the vagi or atropin will quickly diminish the enzyme strength and not the alkali content of the juice or the rate of secretion.

"The hypothesis is put forward that the enzyme content of the pancreatic juice is determined by the vagus, whereas the quantity of $NaHCO_3$ in which the enzymes are contained is determined by secretion. On this hypothesis secretin may play a subsidiary part in pancreatic digestion, since it only insures the presence in the intestines of an optimal reaction for the activity of the pancreatic enzymes."

Having at hand a quite accurate method for the determination of the pancreatic enzyme diastase, we thought it would be interesting to see if there were any change in the enzyme activity after thorough atropinization.

The method of enzyme determination was that which we presented at the Gastro-Enterological Meeting in 1926, and may be summarized as follows:

SUMMARY OF METHOD USED FOR ESTIMATING PANCREATIC ENZYMES

I. Intubate.

(a) Patient presents himself having fasted twelve hours.

(b) Patient swallows tube without aid of water. If small sips are necessary, they are removed by syringe as tube reaches stomach.

(c) Patient inclines on right side; gastric contents are drained into beaker.

(d) Tube allowed to float into duodenum and position controlled by fluoroscope.

(e) Forty c.c. of 33 per cent warmed magnesium sul-

phate injected slowly through tube into bend of duodenum.

(f) Two minutes later siphonage instituted.

(g) Flow discarded until it becomes viscid.

(h) Typical portions of various fractions collected in separate tubes, collecting, if possible, and it is almost always easily done, a clear portion.

(i) If B is clear, use this for estimation; if not, A.

II. Method.

(a) One c.c. bile in 19 c.c. buffer pH 7.7
Buffer:
an M/15 solution of primary potassium phosphate which contains 9.080 grams KH_2PO_4 in 1 litre of solution.
an M/15 solution of secondary sodium phosphate which contains 11.876 grams Na_2HPO_4, $2H_2O$ in 1 litre of solution.
9 c.c. of the secondary are added to 1 c.c. of the primary to make pH 7.731.

(b) Add 1 c.c. 1-20 dilution to 29 c.c. buffer pH 7.7. This makes a 1-600 dilution.

(c) To 3 Folin and Wu sugar tubes add 1 c.c. 1-20 dilution; 0.1 c.c. 1-20 dilution and 0.9 c.c. buffer pH 7.7; 1 c.c. 1.06 dilution, respectively. To each tube add 1 c.c. 1 per cent soluble starch which has been well boiled.

(d) Incubate 30 minutes at 38-40° C. in a water bath.

(e) Add 2 c.c. alkaline copper sulphate of Folin and Wu.

(f) Carry out as for blood sugar by method of Folin and Wu.

(g) Normal results give complete digestion in tubes 1 and 2, and a good reduction in 3. If there is but a slight reduction, use the 1-200 dilution, that is tube 2. At times the only reduction is found in tube 1.

(h) If estimation is made from tube 3 multiply the amount of glucose obtained by 100. If from tube 2 by 33.3, tube 3 by 3.3. This will bring the result to a unity.

(i) But rarely will similar results be obtained in tubes 2 and 3. This has been shown to be due to something other than a dilution phenomenon. The most exact results are to be obtained in the tube of highest dilution showing good reduction.

(j) The results are expressed to represent one hundred times the amount of glucose produced from 1 c.c.—1 per cent starch—by the action of 1 c.c. of 1-600 dilution of pancreatic enzyme as obtained by duodenal drainage.

We feel that the methods of estimation of trypsin are very uncertain, especially as the same result may be obtained from pepsin. Besides this, work of other experimenters using controlled methods shows quite conclusively that the relative variation in the enzyme content is parallel.

The patients were not particularly selected. Some were pure psychoneurotics and others gave evidence of more or less marked degrees of chronic biliary infection. On the first day they were drained as usual and the diastase activity was determined. As some of the patients were those used in developing the diastase test, we made estimations on three or more sections. In later work, having established the fact that the enzyme activity of the B, or second section, is the greatest or the peer of the others, we utilized only this one. In all, eight cases were worked up, and as the results are so uniform we feel that they can be taken as conclusive. In six individuals, after their normal activity was determined, atropinization was brought about by oral administration of successive doses of atropin sulphate grains 0.01 until marked clinical effects of the drug were noted. They presented themselves with dry mouth, tachycardia, at times slight dizziness and headache.

In two, hypodermic injections of one-fortieth of a grain of atropin sulphate produced marked symptoms already noticed by Bloomfield and Kieffer.[28]

The following is a tabulation of results:

Patient	Diagnosis	Administration	Bile Fraction Examined	Control Diastase	Atropinized Diastase
Male (aet.46)	Cholelithiasis	Oral	A	42.13	38.4
			B	51.6	52.8
			C	27.6	14.3
Female (aet.42)	Cholecystitis	Oral	B	11.10	8.82
Male (aet.28)	Psychoneurosis	Oral	B	23.2	32.23
Female (aet.40)	Psychoneurosis	Oral	B	20.0	40.0
Female (aet.37)	Cholelithiasis	Oral	B	18.8	29.62
Male (aet.22)	Normal	Oral	B	100.0	88.88
Male (aet.26)	Normal	Hypodermic	B	88.88	80.0
Male (aet.24)	Normal	Hypodermic	B	92.2	96.4

This table shows that no definite changes were obtained after definite clinical atropinization was produced.

Another point of interest is found in the fact that the drug in no way changed the usual appearance of the alleged A, B and C fractions of

the bile. Coutarde and Guy[29] in 1904 produced contraction of the gall bladder by stimulation of the vagus in the neck. In 1905 Bainbridge and Dale,[30] using dogs with wide-open abdomen and thorax, obtained contractions of the gall bladder by vagal stimulation. This effect was destroyed by atropin. Lieb and McWhorter[31] in 1915, using strips of gall bladder wall immersed in Ringer's solution, and with movements recorded upon kymographs, conclude:

"The gall bladder, like all other smooth muscle, receives a double innervation; the motor impulses are derived from the parasympathetic and those drugs which are recognized as stimulants of this system produce contraction of the gall bladder; atropin, which paralyzes the nerve endings of the parasympathetic, produces relaxation of the gall bladder in presence of moderate tonus."

Consequently, if there is any truth in these observations when transferred from dog to man, one must again question the gall bladder origin of the bile.

DISCUSSION

Considering the number of factors playing a role in the production of pancreatic juice, it is but justifiable to expect some difficulty in working out the tangle. Duodenal stimulation, secretin, vagal stimulation, disturbance of blood supply, condition of vaso-motor fibers, are some of the factors mixed up in the picture.

At the present time a few things are definite for the dog:

(1) Vagal stimulation will produce secretion of pancreatic juice.

(2) Adrenalin, nicotin, electrical stimulation of sympathetic, procedures which raise blood pressure, will inhibit secretion.

(3) Asphyxia, compression of the aorta, either by producing an anemia, or complete stagnation of blood, or a very low blood pressure, will inhibit secretion.

(4) Vagal stimulation produces a primary inhibition, accompanied by dilation of the gland.

(5) Hydrochloric acid introduced into the duodenum and secretin by vein will produce secretion.

(a) There is a difference of opinion as to whether this can be prevented or inhibited by section of vagi or atropin. Mellanby thinks the vagus controls the amount of enzyme, and this can be inhibited by section or atropin which in turn does not affect the production of the alkaline secretin-produced secretion.

In this Anrep does not agree but he drew his conclusions from vagal stimulation which may have increased the vaso-motor tone to the gland and so temporarily held back secretion by its contraction of the ducts.

With these facts in mind it would seem quite probable that doses of atropin of sufficient size to cause clinical symptoms would inhibit the enzyme activity of the pancreatic juice, even though they did not affect its alkalinity and amount. Such expectations were unwarranted in the light of the data brought out above. Perhaps the administration of amounts in excess of that used clinically might have the expected effect. This we have not tried on humans, and we shall continue to avoid doing so.

SUMMARY

(1) Clinical atropinization, orally or subcutaneously produced, does not lower the diastase in pancreatic juice below that found in normal conditions in the same individual.

(2) The same atropinization does not change the sequence of A, B and C fractions of bile.

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12 E. Eager St.

DISCUSSION (Abstract)

Dr. Douglas VanderHoof, Richmond, Va.—Unquestionably the most extensive, as well as the most recent, clinical investigations of the factors concerned in the external secretion of the pancreas have been reported by McClure and his co-workers. They seem to have shown very definitely that it is the entrance into the duodenum of the products of food digestion that stimulates the flow of pancreatic juice and that the onset of pancreatic secretion coincides with the flow of bile into the duodenum. They also showed that gastric chyme is neutralized immediately on leaving the stomach and that the duodenum is never more than faintly acid. Furthermore, the flow of pancreatic juice occurs in an approximately normal manner in the entire absence of acidity, either of the stomach or duodenum, as seen in instances of achylia gastrica. Their results would seem to disprove very definitely both the acid control theory of the pylorus advanced by Cannon, and also the widely accepted theory of Bayliss and Starling on the production of a substance, secretin, in the duodenum, the absorption of which into the blood stream brings about the stimulation of the pancreas to secrete its ferments.

Turning from the clinical side to the experimental field, it is difficult to understand or explain the discrepancies reported in the investigation of the physiology of the external secretion of the pancreas. Pawlow demonstrated that pancreatic secretion could be produced by psychic stimuli. Later Bayliss and Starling, and also Wertheimer and Lepage, satisfied themselves that the pancreatic flow initiated in various ways was not annulled by atropin. On the other hand, Mellanby found that after atropin, as well as after section of both vagi, the rate of secretion of pancreatic juice, and its content of sodium bicarbonate, were unaltered, but that there was a considerable reduction of all three pancreatic ferments.

Turning now to the present report of the clinical study by Dr. Martin, it would certainly appear to be demonstrated that atropin in sufficient dosage to produce the usual physiological effects does not cause any reduction in the flow of pancreatic juice.

This fact is a distinct comfort to all of us who realize that in belladonna and atropin we have most helpful drugs. As the first papers this afternoon were being read, I could not help thinking of the different nervous factors concerned in producing symptoms, and they were emphasized by Dr. Graves in his discussion of the vagotonics. There is no question that there are certain individuals who suffer from marked irritability of the vagus apparatus, shown by definite spasticity in either the cardiac or pyloric ends of the stomach or in other parts of the gastro-intestinal tract, but particularly in the colon, where we so commonly find evidence of spastic constipation or so-called mucous colitis. And, of course, it is in such conditions that we get such wonderful results from full doses of atropin.

Dr. D. N. Silverman, New Orleans, La.—Following some work in Boston in 1921, we started work in the Pathological Laboratory at Tulane University according to their methods. Our findings are to some extent at variance with those of Dr. Martin, especially with reference to the relationship of the different enzymes. We find that there is a quantitative as well as qualitative difference in the enzymes of the pancreatic juices. It is my opinion that trypsin and lipase are more important to pancreatic digestion than diastase. It is these two enzymes that are found diminished or absent in most of our clinical conditions which are associated with pancreatic disease, namely, diarrheas of the protein type.

There is a difference between the quantity of secretion of the pancreatic juices and the intensity of digestive activity of the enzymes. For instance, it has been shown that the administration of fat, cream, yellow of eggs, and so on, will produce a greater flow of bile and a reduction in size of the gall bladder. The cream will also produce an increased flow of the pancreatic juices and an increased intensity of the action of the pancreatic enzymes. But in the study of the duodenum without the use of the duodenal tube it is the administration of proteins such as egg white or meat which will produce the greatest intensity of action of the pancreatic enzymes.

I agree with Dr. Martin that starch or sugar will not increase the activity of the diastase as much as the administration of fat or protein. I wish to emphasize again that trypsin is a very important enzyme for observation. According to the McClure method, the duodenal contents are raised to pH4. We know that pepsin is inactive in media which has a pH not less than 3. The importance of studying all the enzymes has been shown by other workers also. For instance, about two years ago it was shown that in gall bladder disease there was a functional disturbance of the pancreas without disease of the pancreas and a constant diminution in its activity.

Dr. Martin (closing).—We find that the hydrogen-ion concentration of the duodenum is not by any means always alkaline. We have done many hydrogen ion concentration tests upon duodenal contents obtained in this method and our hydrogen ion concentrations vary from about pH 4.4 to pH 6.4. Very rarely do they rise and stay upon the alkaline side. The pH was found to vary in different portions of the duodenal contents.

As to pepsin or rennet: in its estimation we have found perfectly definitely that it will react at pH 7.2; that is, by taking pure gastric juice we have been able to get digestion at this hydrogen ion concentration.

I quite agree with Dr. Silverman that if we could get a good method for the estimation of trypsin it would be highly valuable. It is probably the most important enzyme of the three. I do not believe that the experimental work that has been carried out on dogs will tend to show that there is an unparalleled variation in

the enzymes, and our present day methods are not accurate enough to tell whether there is this definite variation.

INTRACRANIAL HEMORRHAGE IN THE NEWBORN*

By M. HINES ROBERTS, M.D.,
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For the past four years I have been interested in the study of the spinal fluid of the newborn infant. My observations at the outset were in the main directed toward the changes brought about in this fluid by syphilitic infection. However, as the work progressed, I became much impressed by the frequent occurrence of blood in the spinal fluid. A careful analysis of four hundred and fifty routine lumbar punctures has been made. The presence of macroscopic blood in the fluid not resulting from the trauma of puncture has been the criterion in placing a case in the intracranial hemorrhage group.

The accompanying charts summarize briefly the important features of this study.

SPINAL FLUID STUDIES IN FOUR HUNDRED AND FIFTY CONSECUTIVE NEWBORN INFANTS

	Number	Intracranial hemorrhage		Positive Wassermann Reactions				
				Spinal fluid	Sinus blood	Cord blood	Mother's blood	Combined
Full term	394	45	11%	3	13	17	58	66
Premature	56	18	32%	3	3	1	8	19
Total	450	63	14%	6	16	18	66	85 or 19%
Normal delivery	422	51	12%	6	12	16	63	78
Forceps	8	5	62%	0	2	1	1	3
Abnormal	20	7	35%	0	2	1	2	4
Total	450	63	14%	6	16	18	66	85 or 19%

Note: All fluid showed a yellow pigment of varying intensity.

It will be noted that sixty-three, or 14 per cent, of all infants showed macroscopic blood in the spinal fluid, a figure somewhat higher than that found by Sharpe and his associates in some similar studies. As would be expected, the percentage of infants showing intracranial hemorrhage in the premature or abnormal labor groups is far in excess of those for the full term and normal delivery groups. The Wassermann reactions are interesting, though the importance of syphilis as an etiological factor is not emphasized. The low incidence of positive reactions on the spinal fluid as compared with sinus blood and cord blood is striking, and would seem to point toward a later or less frequent infection of the central nervous system.

A detailed study of the sixty-three cases of intracranial hemorrhage is given in the accompanying chart.

A STUDY OF SIXTY-THREE CASES OF INTRACRANIAL HEMORRHAGE IN THE NEWBORN

	Number	Positive Wassermann	Condition at birth			Condition of infants today			
						Death		Living	
			Symptoms of hemorrhage		Normal	Due to hemorrhage	To other causes	Symptoms of hemorrhage	Normal
Full term	45	10	17	38%	28	5	2	3	31
Premature	18	5	12	67%	6	5	2	0	10
Total	63	15	29	46%	34	10	4	3	41
Normal delivery	51	12	20	39%	31	9	3	2	34
Forceps	5	2	3	60%	2	0	0	1	3
Abnormal	7	1	6	85%	1	1	1	0	4
Total	63	15	29	46%	34	10	4	3	41

There are several features of particular interest which I would call to your attention in the above chart. Intracranial hemorrhage frequently exists without producing any clinical evidence of its presence and, unless the routine puncture is done, would go unrecognized. Only twenty-nine, or 46 per cent, showed symptoms of hemorrhage, the others being apparently normal. The percentage of infants showing clinical evidence of hemorrhage in the forceps and abnormal delivery groups was much higher, because the hemorrhage was much more extensive in these cases as, of course, would be expected.

Most illuminating of the figures given are those showing the condition of these infants today after they have been followed for two and one-half years. Ten died within twelve days of

*Clinic, Clinic Session, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

birth, the deaths undoubtedly the result of intracranial hemorrhage as shown at autopsy in five cases. Four died later due to some intercurrent infection. Forty-four are living today, only three of whom show any evidence of intracranial hemorrhage. The remaining forty-one are free of any symptoms attributable to a pathological condition of the central nervous system.

The following patients are presented to show their condition today after the presence of intracranial hemorrhage has been definitely proven at birth:

Case 1.—J. M. B., age 7 years and 2 months, was premature (seven months). The labor was long and hard, a face presentation. Birth weight was 3 pounds 6.25 ounces. The condition at birth was poor; respiration was delayed, the cry was weak, and the baby quite cyanotic. A puncture done thirty-eight hours after birth revealed a markedly bloody fluid. Treatment consisted in spinal drainage on three occasions at twelve-hour intervals and certain supportive measures. Fifteen c.c of whole blood were given in the buttocks although the coagulation time of the blood was normal.

After a stormy period of ten days the infant began improving, though gain was slow. The subsequent development has been about normal: her first tooth appeared at five months, she sat alone at seven months, spoke simple words at twelve months and walked at fifteen months. She was breast fed for twelve months, had cereals at seven months, and a soft diet at twelve months. She did well. There has been no other illness save a transitory gastro-intestinal upset with vomiting.

There is no complaint except that the mother claims she drags the right foot slightly when walking.

Points of interest in the physical examination are as follows: nutrition and development are fairly good. She is bright and alert with no apparent mental impairment. No disturbance of gait can be detected. The deep reflexes are exaggerated, especially the patella reflex on the left. There is a slight ankle clonus on this side. Examination otherwise shows nothing of importance. This patient evidently is still showing slight evidence of cerebral injury.

Case 2.—E. M., age 25 months, came at full term, was normally delivered, and his condition at birth was good. The birth weight was 8 pounds 3 ounces.

Spinal puncture seven hours after birth revealed a slightly bloody fluid under normal pressure. There was no clinical evidence of intracranial hemorrhage and therefore no treatment was instituted.

The development was approximately normal. She sat alone at eight months, had her first tooth at nine months, walked at eleven months, spoke simple words at thirteen months. She was breast fed twelve months, had cereals and vegetables at five months, and cow's milk at six months. She gained well. There has been no previous illness.

The physical examination today reveals a two-year-old infant apparently normal in every respect.

It should be noted that the mother of this infant was syphilitic and received anti-syphilitic treatment during the latter months of pregnancy. Both she and the baby had negative Wassermann reactions at the time of delivery. Subsequent blood tests on the child have been negative.

Case 3.—B. P., age 2 years and 4 months, was born at full term. Forceps were necessary in delivery. The child weighed 7 pounds 3 ounces at birth, respiration was delayed, cyanosis moderate, and his cry was weak.

Lumbar puncture eighteen hours after birth gave a fluid markedly bloody under moderately increased pressure. Two spinal drainages twenty-four hours apart were done.

The subsequent development was as follows: he sat alone at six months, had his first tooth at ten months, walked at eleven months, and spoke simple sentences at eighteen months. He was breast fed fourteen months, with complementary feedings of recolac begun at twelve months. He did well. There was no illness save an occasional "bad cold".

Physical examination today reveals a child apparently normal save for moderate bowing of the legs and a rather severe impetigo.

Case 4.—L. L. R., age 2 years 4 months, was a full term, normally delivered baby. Her condition at birth was good, and her birth weight was 7 pounds 7.5 ounces. A lumbar puncture was done three hours after birth, the fluid being slightly blood tinged. There was no clinical evidence of hemorrhage. No therapy was instituted.

The development has been above normal. She sat alone at four months, cut her first tooth at six months, spoke simple words at eight months, walked at nine months, and made simple sentences at twelve months.

At two months she was acutely ill for a few days with bronchitis. Since that time she has been well.

Physical examination reveals no evidence of intracranial hemorrhage, and except for a mild rickets the child seems perfectly normal.

Case 5.—M. L. F., age 2 years 7 months, was a full term, normally delivered baby. Her condition at birth was good except that she was small, weighing only 5 pounds 7 ounces.

Spinal puncture done eleven hours after birth showed a markedly bloody fluid under considerable pressure. Spinal drainage was repeated twice and whole blood given in spite of the fact that the coagulation time of the blood was within normal limits.

Her subsequent development has been normal. She cut her first tooth at seven months, sat alone at seven months, spoke simple words at nine months, and walked at thirteen months. She was breast fed seven months, then had cereal and vegetables, but no milk. She did well. She has had pertusis recently.

The physical examination reveals no evidence of hemorrhage, though malnutrition is marked with considerable rachitic deformity.

Case 6.—M. G., age 2 years and 1 month, was a full term infant. Labor was normal. Her condition at birth was only fairly good, the cry being immediate but rather weak. Cyanosis was moderate.

Lumbar puncture 44 hours after birth gave a moderately bloody spinal fluid. Two spinal drainages were accomplished at intervals of 24 hours. After the first few days the child did well.

Her development has been normal with the usual feeding history: the breast for approximately one year, and the early administration of solid food.

Today the mother states there is no disturbance, and the child seems normal in every respect.

Physical examination reveals no evidence of intracranial hemorrhage.

Case 7.—L. H., age 2 years, was a full term baby. The delivery was difficult, requiring forceps. His condition at birth, however, seemed normal. He cried well and his color was good.

Twenty-six hours after birth a spinal puncture was done which revealed a moderately bloody spinal fluid. Since there were no untoward symptoms, no therapy was instituted.

The development of this child has been definitely retarded, probably because of the character of feeding. He was breast-fed 7 months, then put on eagle brand condensed milk, which was practically the sole article of diet until he was 20 months old. He cut his first tooth at 12 months, sat alone at 8 months, and said simple words at 12 months. He has never attempted to walk. He suffers with a malnutrition and marked rachitic deformaties. All the classical evidence of this condition is present. He does not attempt to bear the weight of his body on his feet, and the bowing of the legs and the epiphyseal enlargements are extreme. On careful examination, however, there is no evidence of intracranial abnormality. There is no spasticity of the extremities, the reflexes are normal, and mental development is apparently within normal limits. I believe that all symptoms presented in this case can be attributed to malnutrition and rickets.

Case 8.—E. B., age 2 years and 6 months, was a premature infant, approximately an 8 months' pregnancy. The labor was normal, the child's condition fairly good, with no evidence of hemorrhage. The birth weight was 4 pounds 14 ounces.

A puncture was done 23 hours after birth and showed a fluid with a marked degree of hemorrhage. Spinal drainage was done on three occasions. The first few days of life were stormy, after which the infant slowly improved.

The mother states that the child seems normal except that walking has been slow and accomplished with difficulty on account of "knock-knees and flat feet".

Physical examination reveals a rather poorly developed and nourished child with decided evidence of rickets. There is a marked genu-valgum, and the arches of both feet are perfectly flat with considerable toeing-out. She walks with great difficulty. There is no spasticity, however, reflexes are normal, and mental development seems normal.

It seems probable that the above symptoms in this case are due to poor nutrition and rickets.

Case 9.—E. C., age 2 years, 5 months, was a premature infant, weighing 5 pounds, 2 ounces, at birth. The delivery was breech. The condition of the child at birth was apparently normal.

A lumbar puncture 8 hours after birth revealed a fluid slightly blood tinged, but under normal pressure. Since there was no clinical evidence of hemorrhage no treatment was administered.

The development and feeding have been about normal.

Today the mother states that the child seems normal in every respect.

The physical examination reveals a rather poorly developed and nourished infant with mild evidence of rickets. She walks normally, there is no spasticity, the reflexes are present and normal. The mental development is adequate for her age and race.

This group of cases is fairly representative of the entire series of sixty-three babies showing hemorrhage into the spinal fluid at birth. In only one case does there seem to be definite evidence of any intracranial lesion. Two others might be classed as doubtful, though I believe their physical infirmities can be traced entirely to diet.

The subsequent development of these children will be observed with keenest interest. It is too early to draw any conclusions as to their ultimate outcome. At present one is led to believe that the great majority will grow up entirely free of any disorder attributable to cerebral hemorrhage, though it might be easily possible that some of the obscure mental states coming on later in life, for example epilepsy, could have as their basis such a pathological condition.

20 Ponce de Leon.

REVIEW OF OVER TWO THOUSAND FRACTURES IN PAST SEVEN YEARS*

By E. DUNBAR NEWELL, B.S., M.D., F.A.C.S., Chattanooga, Tenn.

During the past seven years we have treated at our Clinic a total of two thousand three hundred and seventy-four fractures divided as follows:

Fractures of chest	163
Fractures of elbow	40
Fractures of femur	77
Fractures of tibia and fibula	235
Fractures of foot	503
Fractures of radius	244
Fractures of ulna	122
Fractures of hand	536
Fractures of head	142
Fractures of humerus	53
Fractures of knee (this includes 11 frac. patellae)	57
Fractures of pelvis	83
Fractures of scapula	24
Fractures of clavicle	48
Fractures of spine	47
	2,374

It was necessary to do sixty-four open operations upon these two thousand three hundred and seventy-four fractures. This, of course, does not include the open operations necessary for fractures of the skull, nor does it include the numerous open operations for compounded frac-

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tures of the metacarpal, metatarsal and phalanges, which after all were simple adjustments through already open wounds. Many of these adjustments of the displaced fractured ends would not have been done by the open method, even on the long bones, if the compounding of the fracture had not been produced by the injury which caused the fracture. I have not included cases treated prior to 1919, as our records are not accurate and complete beyond that date. In this series of two thousand three hundred and seventy-four cases there is an accurate history for every case, and there is an x-ray negative filed away and indexed for every fracture. Open operations were done on the following bones:

Clavicle	2
Humerus	2
Elbow	6
Femur (two of these were compound fracture)	4
Radius and ulna	11
Tibia and fibula	15
Patella	11
Maxilla	6
Depressed zygomatic arch	6
Rib	1
	64

During the past six years there has been only one non-union among the two thousand three hundred and seventy-four fractures, and this was a fracture of the radius. In one tibia case it was necessary for the patient to wear a supporting brace for more than two years before the union became firm. But, without any other treatment than an ambulatory brace to his leg, the union became firm and now he walks without a limp, has no pain, and there is no deformity. In another case of fractured tibia, firm union was delayed for one year, and in several other cases of fractured tibia firm union was delayed for six to ten months. The treatment in all of these fractured tibia cases was an ambulatory splint after the first two months following the fracture. In no other bone of this series was there any marked delay in the normal time for firm union of the fracture. There was one case of Volkmann's contracture in this series.

A boy, aged 15 years, had fallen about ten feet from a tree and landed on the outstretched left hand, fracturing both radius and ulna in the upper third.

The x-ray showed marked overriding of both fractures. There was much swelling of the entire forearm and the circulation in his hand was poor. Under general anesthesia the fractures were reduced and the forearm put up in an anterior and posterior board splint, well padded, and the patient was put to bed in a hospital with an electric pad surrounding the splinted forearm. He was kept in bed in the hospital for four days under close observation. Before he left the hospital the bandages were removed, the forearm inspected and the splints loosely reapplied. At this time the circulation in the hand and fingers was very good, but there were numerous blebs over the forearm. We saw this patient every few days and often every day for several months, removing the dressings and gently massaging the soft parts. In spite of this precaution, he developed a serious Volkmann's contracture.

I believe now that if I had not reduced the fracture at once, but had waited a few days for the swelling to subside and then done a careful open operation, I would not have had this contraction.

The history of the only ununited case briefly is as follows: a white man, aged 39 years, had the right hand, forearm and arm caught in a belt. There was a transverse fracture of the right humerus in the middle third; an oblique fracture of the right ulna and radius 2.5 and 3.5 inches, respectively, from the wrist joint.

Under a general anesthetic, the fracture was reduced and anterior and posterior molded plaster splints were applied to the forearm. The fractures of the humerus and of the ulna united promptly. Four months following fracture, x-rays of the radius showed much callus formation, but non-union. He had atrophy of all the bones of the forearm. Five months later there was still no union of the radius, so a bone graft was placed. No infection followed this operation. Ten months from the date of the bone grafting all splints were removed and he was given a leather brace. The graft had not grown, there was still non-union and the bone graft was being gradually absorbed.

DIAGNOSIS

All of these fractures were diagnosed by x-ray findings; in no instance did we depend on physical examination alone. Many fractures are missed, even after the most painstaking physical examination, if an x-ray is not made. Contrarily, many cases will be diagnosed as fractures when a physical examination and the history are depended upon without the aid of the radiograms. We consider the negative x-ray report in many cases just as valuable, both to the patient and the surgeon, as the positive finding. Many years ago I formulated the following rule which is rigidly carried out in our Clinic: whenever the blow or trauma has been sufficient to cause a fracture, an x-ray picture must be made whether or not the physical findings indicate that there is a fracture. On hundreds of occasions we have been justified in this practice, and we never offer any apolgies for the extra expense that the patient or industry has to bear, for we know full well, if we did less, the patient, the industry and the attending surgeon would all suffer thereby.

TREATMENT

In this series of fractures it was necessary to do only sixty-four operations, because we could not properly reduce the fracture or the fracture was badly compounded, and by simply enlarging the opening the reduction could be made more

accurately and with less trauma by direct open manipulation. Except in a few instances we are bitterly opposed to the open operation for the reduction of fractures, and the fact that we did only sixty-four open operations in two thousand three hundred and seventy-four fracture cases proves our conservatism in this regard. We believe that the less skill, the less experience, the less patience the bone surgeon has, the more he is inclined to do the open operation for the reduction of fractures. Despite our general antagonism to the open operation for reduction and maintenance of fractures, there are some fracture cases in which we always advise the open operation.

In fracture of the patella we nearly always do the open operation unless there is some reason why we should not. When the fracture is caused by a direct blow on the patella and the ligaments are probably not torn, then an open operation may not be necessary; but even in these cases, when the fragments cannot be easily held in accurate apposition by position and splints, we do the open operation. When the fracture is due to muscular violence, we always do the open operation, because in these cases the ligaments have been torn and we cannot expect a normal knee joint unless the ligaments are carefully sutured. In depressed fractures of the zygomatic arch we have found that we get the most perfect results by open reduction and this is usually done under local anesthesia. In fractures of both bones of the forearm we have at times been unable to get a satisfactory reduction and maintenance without an open operation upon one or both bones. In these cases, where repeated efforts at reduction have failed, we have found it far more satisfactory to do the open operation than further to damage the soft parts by renewed attempts at reduction and maintenance.

In fractures of the bones of the forearm where the fragments are not easily held in place by position and splints, we believe the open operation is the method of choice. In certain mutilating fractures of the forearm when the patient has a greatly swollen forearm, when the circulation is poor and further trauma from the manipulation for reduction of the fracture would endanger the life of the limb, the limb is placed in hot pack for a few days and then the open operation is done. This same procedure is carried out in some of the mutilating fractures of the leg, foot and ankle. Also in oblique fractures of the tibia, where maintenance is difficult, we advise the open operation. In fractures around the elbow when satisfactory reduction and maintenance cannot be obtained by manipulation and position, we believe that the open operation, especially in adults, offers the best functional and cosmetic results.

The method of doing an open operation is of the greatest importance. Some surgeons affect the "no touch" method, with the ridiculous repeated resterilization of instruments, as the important factor in the success of open operation. I feel that the one greatest factor in the success of all open operations upon bones is the gentle handling of tissues by clean-cut dissection; not dissecting the soft parts from the attachment to the periosteum; interfering with the blood supply to the bone as little as possible, and never lifting the bones from their bed by rough retraction; not disturbing the periosteum; not removing attached fragments of bone; apposing the fractured ends without suturing or plating, if this is possible, and when it is not possible, using the fewest retention sutures or appliances that can hold the ends in apposition. I prefer silver or bronze wires as suture material in holding the fragments in apposition. When this technic has been carried out, we need not fear infection, delayed union or non-union.

We do not dread compound fractures when the blood supply has not been greatly damaged, provided we see these cases a few hours after the injury. We shave the parts, do a debridement, use ether and iodin freely and suture the wounds without drainage or with just a rubber wick, for forty-eight to seventy-two hours, applying retention splints. We do not expect infection or delayed union.

When the compounding is caused from the fractured end of the bone's tearing through the soft parts and the skin, then a debridement is not done, but the exposed bone is carefully cleansed with ether, the fracture adjusted, and, if there is no hemorrhage, the wound is closed. If there is hemorrhage, or if it is difficult to appose the fractured ends, I do not hesitate to enlarge the opening, adjust the fracture by direct manipulation, control bleeding, then close the wound without drainage.

Where we have seen the badly compounded fracture for the first time several hours after the injury, or if it is a gravely mutilated fracture with blood supply decidedly impaired, then we do a very careful debridement and dakinize the wound until the soft parts can be drawn to-

gether with adhesive straps. We have not found that our compounded fractures have any tendency to delayed union, and we have not had a case of non-union in a compound fracture. Neither have we had a death from infection following a compound fracture. In comminuted fractures it is our impression that firm union is more prompt than in simple transverse or oblique fractures.

In all of our fractures of the femur in this series, with the exception of the four open operation cases, we used traction with the Thomas splint and the Balkan frame. We have found that continuous traction is far more effective in reducing an overriding fractured femur than is a general anesthetic and the use of the orthopedic table. The greatest amount of traction must be put on during the first few days, or until the overriding has been overcome. We then lessen the amount of traction so as not to injure the ligaments of the knee joint. In the other seventy-three cases, moleskin adhesive applied to the skin below the fracture gave sufficient traction to overcome muscle pull. By this method we have had no non-union case, no appreciable loss of motion in the knee joint, if this joint is manipulated daily after the first week and during the six to eight weeks that the limb is suspended in a Thomas splint. There has been no deforming shortening of the limb except where there was loss of bone in extensive comminuted fractures. In only two cases was it necessary to use skeletal traction.

In fractures below the knee we use a circular plaster cast, always opening the cast at once with the Gigli saw to facilitate observation, massage and manipulation, or we use a molded plaster splint with a footpiece.

In fractures of the humerus we use a Thomas splint while the patient is in bed, and when up we use the plaster-cast splint that holds the arm at right angles to the body. This splint is only used in those cases where it is difficult to hold the fractured ends in good apposition.

In fractures of the forearm we prefer the molded plaster splints, or the anterior and posterior board splints, well padded. However, we feel that the kind of splint is of little importance, as accurate reduction of these fractures of the forearm is the essential for 100 per cent functional and cosmetic results. In fractures of the femur, if we have good alignment, we are content with 10 per cent apposition. In fact, we should not think of doing an open operation on the femur in a child, even if there were no more apposition than the edges touching, as children have a marvelous faculty of correcting the bone defect of the femur. In adults we are never content with less than 10 per cent approximation (if we have good alignment), but in only three cases out of fifty has it been necessary to do more than to use continuous traction with properly placed pads to get this amount of approximation.

Our fractures are inspected often, at least once a week, for ambulatory cases, removing splints and massaging the soft parts. This prevents non-union by stimulating the circulation in the limb, prevents pressure injury to the soft parts; prevents atrophy of the muscles, and gives an opportunity for early passive and active motion in the joints. Absolute immobilization of the fractured ends is a causative factor in non-union. Some motion in the fractured ends stimulates osteogenesis and prevents non-union.

CONCLUSIONS

(1) Non-union following fracture should be very rare.

(2) Firm bony union seems to develop in less time following a comminuted fracture than it does in a simple, transverse or oblique fracture.

(3) Compounded fractures, where the blood supply has not been seriously impaired and the soft parts are not gravely mutilated, unite as quickly as simple fractures.

(4) Absolute prolonged immobilization of fractured ends not only is non-essential to normal osteogenesis but retards the normal healing process in fractured bones and the functional activity of the limb.

(5) Early reduction means easy reduction. Early massage and manipulation mean quick restoration to normal function.

DISCUSSION (Abstract)

* *Dr. Willis C. Campbell, Memphis, Tenn.*—Dr. Newell has demonstrated the excellent results obtained in the treatment of fractures by observing two important principles: first, the mechanical reduction, and, second, the preservation of function and the evidence of bone reduction. It is interesting, in comparing any group of cases, to observe the difference of type of fracture that comes to different surgeons. Dr. Newell has had five hundred and thirty-six cases of fracture of the hand and five hundred and three cases of the foot. I have not had anything like that number and think they must be due to some peculiar industrial activities in his part of the country. He mentioned a certain number of fractures of the radius and of the ulna. I do not know

whether he calculated both bones of the forearm and both of the legs as separate fractures, or whether he considered them together. In my classification, I have considered fractures of both bones of the forearm and both bones of the leg as one fracture. I believe we should have some standardization in making reports.

Dr. Newell mentioned another question which I brought out yesterday in the discussion of ununited fractures: that non-union today is caused by the improper and inadequate treatment of fractures. Non-union is on the increase, but if fractures are treated along conservative lines there will be very few ununited fractures. They are due to many causes and, I think, are the most important thing we have to combat today. Too much open surgery increases the number. The general principles involved I agree with thoroughly, though no two men approach the subject in the same way. Dr. Newell's cases are industrial and mine are largely private cases.

My general method has been to reduce under an anesthetic and confirm by x-ray examination. This permits the patient to leave the hospital earlier.

Dr. Newell mentioned delayed union. We have many cases in which there is almost but not quite complete union. This is really an ununited fracture which is of a dangerous type. It is difficult to elicit the slightest degree of motion, but very often the patient can show one the amount of movement. This is the type in which the patient, if allowed to get up, later has deformities.

The after-treatment of fractures is greatly neglected, and many deformities are due to the fact that we do not use a retention apparatus afterward. In fractures of the femur as well as in fractures of the lower leg, some apparatus should be used to protect the bone, but permit weight-bearing. It is never necessary to operate upon fractures of the femur in children. As Dr. Newell mentioned, except in those rare cases in which we have compression of the popliteal artery, no fractures of the lower end of the femur need be operated upon. It was interesting to note the number of fractures of the femur Dr. Newell has had, and how few open operations were carried out. He says they have used the open operation in about one-tenth of their cases, which I think is all that is necessary. My method is to obtain fixation on the Hawley table. Dr. Newell works from another traction apparatus, but we work for the same end.

Dr. Urban Maes, New Orleans, La.—I wish particularly to comment upon the case in which Dr. Newell got a Volkmann's contracture and ischemia. Such a result is always a disappointment, and it is in the hope of guarding against it that we always caution our students against putting on tight splints, though in many instances the splints are not to be blamed. If I understood Dr. Newell correctly, when he first saw this boy there were some bad signs in the hand, coldness, numbness and blueness. A German observer has called our attention to the fact that when there is a blood vessel injury with ischemia there may be a subaponeurotic hematoma responsible for compression, and in such a case tight splints are not to blame for the subsequent contracture. If you will observe some of the patients who exhibit blue arms and poor circulation, you will feel a mass beneath the aponeurosis, and incision of this hematoma will often relieve the compression and prevent Volkmann's contracture. A subaponeurotic hematoma, which produces pressure from within, will give just the same results as those which occur when the splint is applied too tightly and bad results are due to pressure from without.

Dr. Newell (closing).—We have paid no special attention to the diet or general nutrition of the patients, but give them general good care, and feed them well.

I think if I had done in the case of Volkmann's contracture what Dr. Maes suggests, the result would have been much better, for I think the cause was internal ischemia. If I had done an open operation to afford drainage, I would probably not have had the contracture.

I agree with Dr. Campbell in regard to after-treatment. For six months we have our patients wear a supporting splint, and usually they wear a leather jacket or plaster splint for at least two months. We consider the after-care much more important now than we formerly did. We classify the fractures of the radius and ulna as separate fractures.

In none of our cases have we had a lawsuit.

GENTLENESS IN UROLOGY*

By REX BOLEND, B.S., M.D.,
Oklahoma City, Okla.

Everything on this subject can be said in the one sentence:

Avoid trauma, both chemical and mechanical, in management and treatment of the urological tract.

Our efforts in dealing with the subject will be confined to emphasis of some well known principles, recalling some history, and perhaps adding a new thought here or there.

It has been my custom to carry on the blackboard in the clinic the before mentioned sentence: avoid trauma, chemical and mechanical, and observe gentleness in all manipulations of the urethra.

Under trauma, for teaching purposes, we consider: (1) strong drugs; (2) irritating conditions (cotton over glans, string tightly around glans, etc.); (3) too forcible use of a mild drug; (4) drugs, though not strong, which have a peculiar irritating effect on a certain individual; (5) incompatible combination of drugs. This is a point which, it would seem, need not be mentioned, but I have repeatedly seen men use novocain in the urethra and bladder, followed by mercurochrome. The mercurochrome immediately precipitates, leaving an inert irritating substance. (6) Sounds and instillation tips, which are too large. (7) Improper and poor technic in introducing instruments. (8) Roughness in prostatic massage. (9) Overdistention of bladder for cystoscopy. (10) Overdistention of kidney pelvis with solutions.

*Read in Section on Urology, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

It is really appalling how slowly we seem to realize a principle in the practice of medicine. For example, I can well remember the very strong solutions we formerly used. We filled a patient's bladder to overdistention with an irrigator, hung high on the wall, followed or preceded by a sound of a caliber that would cause bleeding. Some of us can remember the force pump used to inject solutions into the bladder. Since these methods have been discontinued by most of us, we see less strictures of the urethra, fewer cases of epididymitis, and other complications from urethral infections. It is rather rare now for a young man to report with multiple urethral strictures. In the face of this fundamental principle, why do some use such force in washing a kidney pelvis? After patients show marked evidence of pain, I have seen operators continue to inject more solution. If 3.5 c.c. fill the kidney pelvis, will 10 c.c. do any more good? Sometimes the solutions are so strong they will destroy any mucous membrane, and, too, there are certain people who do not tolerate the average strength solution. To use these solutions on such an individual constitutes trauma in this connection. So why, if 1 per cent mercurochrome produces intense pain and irritation, continue to use it?

We are very careful about incompatible drugs in our prescriptions, though daily I venture to say, many irrigations are given with silver nitrate added to boiled tap water, or silver nitrate injected into a bladder with small quantities of urine still present. Why not take a hint from our colleagues in the ear, nose and throat departments. Did any one ever hear that they prescribed a gargle of silver nitrate or distended an antrum with it?

The average caliber of the urethra is well known, but, as we all know, varies considerably. For ordinary instillations, why use a tip, size 28 F, when the meatus admits only 24? There are occasions when it is necessary, but never during the acute stage of an infection. In passing, we might add, the very small tip is more damaging than the large.

The sound is indispensable for the urologist, but in clumsy hands, or when used without knowledge, or respect for the pathology present, it is perhaps on a par with the sharp curette. To use a sound that does not dilate is absurd, of course, but just here is where utmost carefulness, gentleness and judgment must be exercised. The worst possible trauma is the result of the improper use of the sound. Only the most skilled in its use should use anything less than 18 F. in the steel sound.

I mention roughness in prostatic massage, before this Section, only to call to your mind how little the average practitioner knows about it, and the damage that can be done by "poking" or rolling the finger about the gland, and perhaps never recognizing the prostate or vesicles. It is not so uncommon to follow a careful internist who has pronounced a prostate normal, and be able to express pus on proper massage. There is so much to be said on the subject, and it is so little understood that I feel it is time for the urologists to begin to tell our colleagues in other lines, some facts about the prostate.

There are times when the bladder must be tightly distended in order to see or enter the ureteral orifice, but these are few, and the more ureteral catheterizations I do, the more I find can be done with the bladder merely smooth. And many, many times one can readily enter the ureter long before the distress signal. How many of you have been cystoscoped, and why would you dread it? Because the average urologist is not nearly so gentle or careful as the average dentist, whom we all dread.

Once a catheter is in the ureter, extreme care and gentleness is of the utmost importance. Reference has already been made to the danger of overdistention of the kidney pelvis.

There are many technical contrivances for injecting the kidney, any one of which is all right, but not essential to a careful operator. I have been asked this question: "Isn't complete distention of the kidney pelvis necessary for good pylograms?" My answer is: "Complete filling of the cavity, yes, but distention is not necessary." The volume of pyelographic solution is not an important factor for a good picture.

1010 Medical Arts Building.

DISCUSSION (Abstract)

Dr. Basil A. Hayes, Oklahoma City, Okla.—We know from other branches of surgery that it is wrong to curette an infected uterus or to squeeze a boil. The same principles apply to urological surgery. We should be extremely gentle in all our manipulations. Massage affects a prostate in two ways: it causes drainage, and vaccination of the patient's system. Massage sufficient to produce drainage is all right, and massage sufficient to produce a mild inoculation into the prostatic substance, but too much massage would be over-inoculating with the toxic dose and bruising the tissues to increase the extent of the infection.

Dr. Montague L. Boyd, Atlanta, Ga.—Urological examinations on the whole are the most trying of all medical examinations, and we are, therefore, particularly indebted for any suggestions or advice which will enable us to make our patients more comfortable.

I am somewhat of a fanatic myself on the subject of gentleness in urology, and I employ novocain more frequently than the average urologist, but in spite of all my efforts I realize that my patients often show a fine self-command to undergo all the discomforts I have to cause them.

In elaborating upon some of Dr. Bolend's points, I would suggest that the dilatation of the urethra with sounds be undertaken as gradually as possible, for it is the first few times that instrumentation is undertaken that the patient suffers the most, and if the urethra is prepared for instrumentation by irrigation and the passage of small instruments, the larger sized instruments are subsequently borne with less discomfort.

And so with massage of the prostate and seminal vesicles. It is very difficult to empty the seminal vesicles when the patient is straining. All urologists no doubt have seen patients who have been treated by those unskilled in the use of urological instruments. We urologists owe it to our patients and ourselves to protest openly against the employment of urological instruments by those unskilled in their use, for too many urological cases are being treated by general practitioners and surgeons.

Dr. W. R. Barron, Columbia, S. C.—In considering comfort of patients during urological examinations, I wish to report two cases of novocain poisoning from the use of 1 ounce of 4 per cent solution instilled into the urethra and bladder. One case was in a negro man and one in a white man. On endoscoping these cases after their reaction from novocain, I found extensive raw surfaces in the posterior urethra of each which would afford very rapid absorption of novocain, accounting for its toxic effect. Each case had widely dilated pupils, pulse coming down to 40, twitching and tenseness of muscles, with delirium lasting fifteen minutes.

Dr. S. J. Sinkoe, Atlanta, Ga.—Dr. Bolend's paper was very interesting as well as timely since it impresses us with many facts that are very essential to the ultimate health of our patients and which we are liable to overlook. The interesting points that he has brought out are of prime importance. Particularly is gentleness necessary in using harsh metallic instruments for the removal of ureteral and renal calculi. These instruments, even though properly used, will produce trauma and add to the severity of the infection. Professor Eugene Joseph said to me that he did not see how it was possible to introduce some of these instruments into the ureters without causing harm to the patient.

The urologist, particularly in choosing contrivances for ureteral manipulation, should depend more upon flexible material, especially of the rubber or woven variety. The latter, besides being comparatively easy to introduce, will not traumatize the mucous membrane which is already in a state of inflammation.

Dr. R. A. Hennessey, Memphis, Tenn.—Gentleness implies painlessness. I think we owe it to ourselves to use every care possible to lessen the fear that so many people have of the diagnostic procedures in urology. There seems to be, at least in my part of the country, a steadily increasing fear of extensive urological examinations, for patients often come into the office and say: "I am willing to submit to anything except the cystoscopic procedure." To combat this tendency I have been using sacral anesthesia in 30 to 50 per cent of the cases, who apparently present advanced or painful urological lesions.

A uniform effort to obviate pain will encourage earlier examinations and thus tend to effect a reduction in urological mortality.

Dr. Bolend (closing).—Gentleness in urology doesn't mean anesthesia. We should be gentle with the tissues, and it is a question in my mind whether 4 per cent novocain in the urethra means gentleness or anesthesia. Maybe 1 per cent was suggested in my paper.

I do not believe that you get quicker anesthesia from 4 per cent novocain than from 1 per cent, or even 0.5 per cent. The Doctor said that gentleness implies lack of pain, which is only one-half true, not even half of what I meant the paper to imply. I meant gentleness with the tissues, not to traumatize tissue. Of course, the first thing we think of is not to hurt the patient but more fundamental is to avoid trauma to tissue.

One other thing I might add, as a suggestion of the cause of severe pain following pyelography, is a temporary paralysis of the kidney, resulting in lack of power to empty itself after complete distension for picture.

PRESENT AND FUTURE ECONOMIC STATUS OF OBSTETRICS

By J. L. ANDREWS, M.D.,
Memphis, Tenn.

I bring this subject to the attention of the Obstetrical Section of the Southern Medical Society without apology.

For purposes of clarity and brevity the paper is divided into two parts. The first part is to prove and develop certain well-known facts in connection with the practice of obstetrics as follows: that obstetrics is the poorest paid of all the specialties; that obstetrics has not kept pace in development and recognition with other specialties; that, however it may or might have been in the distant past, childbirth from beginning to end, today is rarely a strictly physiological process, but from beginning to end constantly veers and tends toward the abnormal; that if all women, particularly primiparae, were delivered by well trained obstetricians, the work of gynecologists and surgeons would be greatly reduced, possibly 25 per cent or more; and that, however altruistic and broad-minded our attitude may be in our efforts to improve the status of the practice of obstetrics, we cannot afford to ignore the economic aspect of the situation.

*Read in Section on Obstetrics, Southern Medical Asscciation, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

The second part is an inquiry into the causes of unfavorable conditions, and offer suggestions for improvement.

In the preparation of this paper, I sent out questionnaires to fifty of the leading obstetricians in the Country. I acknowledge very gratefully the kindly assistance of Dr. Wm. T. McConnell, Secretary of this Section, in sending out the inquiries. I received forty-two replies, which I claim is a record. This paper, therefore, presents the composite views of forty-two of the leading obstetricians of the Country. I was somewhat surprised and greatly delighted over the cordial reception of the inquiry, and the interest that seemingly was aroused. Some of the gentlemen wrote rather extensively, and to all who responded my heartiest thanks are due and hereby proffered.

Questions (1) and (2) of the inquiry: "Do you believe that obstetrics should be practiced as a specialty alone?" Twenty three answered "No," that it should be combined with gynecology; one with pediatrics. Six answers were modified, mainly that preferably it should be practiced alone with a strong leaning to gynecology. Thirteen answered categorically, with more or less emphasis, that obstetrics should be practiced alone.

As to this point, my own ideas are not dogmatic and arbitrary, but I believe, on the whole, that obstetrics and gynecology should be combined. My main reason is that an obstetrician of even large practice will hardly do enough cesareans to keep thoroughly fit for abdominal surgery. A very practical objection to the combination is that very few men who can succeed with gynecology will continue with obstetrics. Time and again I have seen this proven. I really believe that it is difficult for an obstetrician to command much gynecological practice. This is "as is," and not as it should be. Another objection to the combination that was suggested by several of the gentlemen is that after a hard gruelling night with a knotty case of obstetrics a man would be in poor shape, physically and mentally, to do abdominal surgery.

Replies were received from three authors whose works are standard and largely used in teaching. I was interested to note their replies to this question. One replied emphatically that obstetrics should be practiced alone; two, that it should be combined with gynecology.

Question (4) as to the proportion of cesareans done by obstetrical specialists. The replies varied widely, from 2 to 80 per cent. Fifteen replied on the percentage basis, and the average from 2 to 80 per cent was 35 per cent. Four replies were "less than half." Five replied "small minority." Four replied "practically all" or "major proportion." One of the most distinguished obstetricians in the country replied to this question: "Cannot even guess, probably more by surgeons who know little of obstetrics."

I am prepared to give accurate statistics as to the situation in Memphis. I collected data of 132 cesareans done in four hospitals for the years 1923-4-5. Forty-two were done by one obstetrician, and seventeen were done by three other obstetricians. Twenty were done by a general surgeon who does not accept obstetrics under any possible circumstances. The remaining operations were done by general surgeons, gynecologists and men really difficult to classify.

For this period (1923-4-5) the total number of deliveries was 3,928. The percentage of cesareans was approximately 3.4. Six deaths occurred in the series, two of which were due to eclampsia and occurred in a few hours after operation. One death was caused by pneumonia on the twelfth day.

Indications for operation were: deformed pelvis, 74; eclampsia, 16; and placenta praevia, 6. The rest were for various indications.

Question (5) was to the recognition of obstetrics as a specialty. Practically all answers were that obstetrics was recognized as a specialty, though many answers were modified, many indicating a belief that recognition was coming about more or less rapidly.

Question (7) was as to whether or not recognition among physicians and laity has kept pace with other specialties. The answer to this question was almost uniformly "No," though some answers were modified. As to reasons for this condition of affairs, many assigned the desire of the general practitioner to do obstetrics in order to hold his family practice, and because he considered it his legitimate field. Ignorance of the laity as regarding the seriousness of childbirth was given by several. Some other reasons were: "Inadequate remuneration for the skill and time demanded;" and "Until recent years, few of the medical schools have given adequate attention to the practical teaching of obstetrics, with the result that the obstetrical end of most teaching hospitals is usually the poorest."

Question (9) dealt with obstetrical fees and incomes. With two or three exceptions, all re-

plied that these fees and incomes were terribly out of line with other specialties. In fact, the general expression was "most poorly paid of all." As to concrete figures, the estimate was one-half of the income of other specialties.

I believe that the keynote of the present unfortunate situation of the practice of obstetrics is ignorance of the laity of the seriousness and importance of childbirth. We hear constantly of the gypsy woman, following the Romany patteran, who deserts the caravan for a day or two in the brush to have her baby, promptly rejoining the caravan. But we hear little or nothing at all about the gypsy woman who never quits the brush, giving up her life in the bravest and most unselfish fight of all.

My best idea, however, of time wasted would be argument in this presence to prove that obstetrics is well-nigh constantly more or less pathological. You gentlemen know this only too well, but the laity does not know it. When the laity become thoroughly convinced of this fact, we may expect improvement in the status of obstetrics, and not until then. In Memphis, in ten years, the practice of pediatrics has become thoroughly well established. Why? Simply because the pediatricians demonstrated that they could take care of babies better than the general man. This leads directly to the question of responsibility of the medical schools. Some of the replies indicated considerable pessimism over this point. One particularly pessimistic obstetrician wrote: "As long as medical colleges continue to treat obstetrics as a stepchild of medicine by permitting gynecologists to combine these two most important branches, one cannot expect to impress the medical student, the midwife or the public with the importance of obstetrics as a specialty. Furthermore, it seems that the heads of medical departments of our universities take pleasure in calling the medical students' attention to the fact that obstetrics is a minor subject. Some day, however, we hope the laity represented by the intelligent women leaders will become sufficiently educated to the importance of obstetrics as a specialty, even before our eminent deans and gynecologists."

I have given this rather lengthy quotation, certainly not because it represents my own views, because it does not, as I consider it too drastic; but for the purpose of acquainting our medical teachers and authorities with the fact that forty-two of the leading obstetricians in the Country have expressed themselves more or less emphatically as believing that the teaching of obstetrics in our medical schools at present is not all that could be desired. Be it said to their credit, of the number quoted, that several are teachers of obstetrics, and acknowledge this fact in greater or less part. My own opinion is that there is great improvement in our schools in this particular, and that the situation will continue to improve. My own idea is expressed in the following quotation from an eminent obstetrician, a teacher and author: "I do not believe that obstetrics will obtain a satisfactory scientific status until the greater part of our university schools for medicine have well equipped and endowed women's clinics where promising young men can obtain first rate practical and scientific instruction in gynecology and obstetrics."

To revert for a moment to the question of obstetrical fees and incomes; it has previously been remarked that practically all of forty-two obstetricians who responded agree that obstetrical incomes compare very unfavorably with incomes in other specialties. As to the reasons for this condition, I shall quote entirely from the opinions of one man, because they seem to cover the situation so thoroughly:

"I think that at present so many physicians give poor obstetrical service that they should be paid what they are worth, i.e., very little. The man giving good service at present is getting more than the first mentioned, but not his full desserts, though his condition is improving. The nature of obstetrical practice is such that it will always, in general, be underpaid for the following reasons: (1) Babies come to young people who are making their first money. (An old man with a fortune is glad to pay all of it for a new lease of life, e.g., for a prostatic operation.) (2) The 'upkeep' of babies is high. (3) The obstetrical case takes five times as much time and labor as the other cases, and the fee, if proportionate, would be an overwhelming burden on the family. Therefore, the obstetrician must be altruistic."

This quotation is from a distinguished obstetrician who has done, I believe, more than any man in the Country to enhance the dignity and importance of obstetrics. May I add that, however much we agree that obstetricians should be altruistic, altruism cannot buy automobiles, gasoline, office space, or employ nurses.

In this paper I have quoted liberally from the views of gentlemen who so kindly responded to my inquiry. For reasons that I trust will be

obvious, I have not mentioned the names of those quoted. I feel sure that they will pardon my use of their ideas in making my paper presentable.

In conclusion, this paper is presented by an obstetrician who cannot consistently point with pride to anything that he has ever done calculated to improve the status of obstetrics, and enhance its importance. His professional career has been checkered and featured with many by-paths. The somewhat inglorious appellation of "man midwife" may very properly have been bestowed on him. He has never occupied place in the seats of the "obstetric mighty." But for this very reason, may it not be true that in a general survey of the situation his perspective is broad and clear? Sometimes, at least, this is true.

At any rate, this is true: that our best thought and our best effort should be devoted to the highest interest of the child-bearing woman. This thought has actuated the writing of this paper. Our highest ambition should be the welfare of the "mothers of men," as they pass, for the moment, through the valley of the shadow.

DISCUSSION (Abstract)

Dr. R. A. Bartholomew, Atlanta, Ga.—We all agree that the obstetrician is not paid an adequate fee for his services, but we must consider that his services are most often required in families just recently established, and his fee must not be prohibitive to the extent of discouraging childbearing. To offset this disadvantage is the fact that the obstetrical case permits ample time for the family to budget its finances in order to meet the obligation. It is not like the emergency case of acute appendicitis that comes unawares and finds the family unprepared for the expense.

Hospitalization of the obstetrical patient enables the physician to render better service at the time of delivery and safeguards the mother and baby in many ways; but the expense of the convalescence can be lessened materially without risk by permitting the patient to go home early if necessary.

There is an increasing demand for the specialist in obstetrics and the field is sufficiently remunerative to attract the best men in the profession. Such a man should have a training which includes both gynecology and obstetrics in order that he may be prepared to handle the surgical complications which may arise, and do so with the judgment which comes only from a large obstetrical experience.

The bulk of obstetrical practice will continue to be done by the general practitioner. He will come to be better paid for his services not only through better appreciation of obstetrics which will naturally result from more thorough modern training in our medical schools, but through better appreciation of the importance of obstetrics on the part of the laity, resulting from education by the lay journals and prenatal clinics.

Dr. H. W. Johnson, Houston, Tex.—I do not like to hear Dr. Andrews abuse the medical school as he does. The medical colleges today are turning out just as good obstetricians as surgeons, ophthalmologists, urologists, and so forth. Colleges can only give the groundwork in any of the branches of medicine. They cannot train a man in one specialty and not in another. If the graduate wishes to practice obstetrics as a specialty, he must specially prepare himself for this work. With this done, he is in a position to give the expectant mother every essential of prenatal care, the best possible attention during her delivery, and painstaking post-partum care for a period of eight weeks. At the conclusion of all this he can send a bill that will make the father realize that adequate service has been rendered. Where people are well-to-do the bill should be made large enough so that obstetrics will not be altogether unprofitable. With a little education, the average man, working on a fairly small salary, can be shown that if he can buy an ordinary piece of furniture for one hundred dollars and pay for it in installments, one hundred dollars for a baby, considering the relative value of the articles, is not out of line and he can pay for it also in installments.

Dr. D. R. Neil, Nashville, Tenn.—To say that a man will be paid all that he is worth is very frequently true. Then let us encourage our medical brethren to value their services higher, to do better work and demand more for their work. I recently spoke to a young man who was doing quite a bit of obstetrical practice, who assisted in a general practice, but had an unusual number of obstetrical cases, of course, among the poorer class. He charged ten or fifteen dollars per case. I said to him, "That is out of the question. You are a young man now and you can keep it up for a while, but after a while you will not be able to get away from the ten and fifteen dollar patient and you will stay just where you are." You must educate not only the medical profession but the people with whom you come in contact.

Dr. W. T. Pride, Memphis, Tenn.—If you charge a man two dollars a visit, he does not think you are very valuable, and he does not appreciate your advice. But charge him five dollars and he is thoroughly satisfied. It is the same way with obstetrics. Twenty-five dollars, fifty dollars and seventy-five dollars for obstetrics, and one hundred and fifty dollars for tonsil operations do not agree very well. So the object of this paper is really, I think, to encourage us all to charge a more equitable fee for our services.

Dr. John T. Altman, Nashville, Tenn.—In Chicago I was told that the obstetrician based his charge on the amount the man earned, and charged him his salary for one month. If a man makes a hundred dollars a month, they charge him one hundred dollars. If he makes five thousand a month, they charge him accordingly.

MADURA FOOT IN A GEORGIA NEGRO*

By CHARLES C. HARROLD, M.D.,
Macon, Ga.

This case is being reported solely on account of its rarity.

The patient was exhibited before the Sixth District Medical Association of Georgia on December 2, 1925, and so far as I have been able to find out is the first black grain type found in a native American, and the second found in America. I reported it first as the only case of any type in a negro, but this statement may be incorrect. I was able to find reports of only ten American cases when I first saw my patient, and I reported him as the eleventh in America. Since that time, on March 6, 1926, the *Journal of the American Medical Association* abstracted a report of an additional case by Gammel and others from Cleveland, who stated that their case made a total of twenty-one of the condition. Therefore, my case makes a total of twenty-two up to date. The Cleveland case was also of the black type and existed in a native American.

The best description I have been able to find of the disease is by Winslow, of Baltimore, in the *Annals of Surgery* for October, 1917. Winslow reports a case studied by him at the University Hospital in Baltimore and reported at the American Surgical Association. Any teacher lecturing to students on this subject could not do better than to read his report. I shall quote from him fully:

"Madura foot or mycetoma is a fungus disease due to several varieties of vegetable growths, usually of the streptothrix family. Clinically it is a chronic inflammatory condition, usually but not invariably affecting the tissues of the foot, in which the foot becomes much enlarged with nodular masses that break down and form sinuses from which a thin purulent fluid escapes. In this discharge are seen pale or black bodies which, when examined microscopically, reveal the nature of the affection.

"It occurs in three forms: the yellow or white, the black, and the pink or red varieties. These varieties are so classified from the appearance of certain grains or particles that escape with the discharges from the sinuses which are found in the affected parts. The granules found in the black form differ very materially in appearance and characteristics from those of the other forms, being black in color like grains of gunpowder, and hard and resistant to pressure. This form is due to a more highly organized fungus than the other types.

"The disease usually begins on the sole of the foot as a small swelling, painless at first, but as the condition progresses, becoming painful and interfering with walking. As the infection extends, other nodules form and suppurate and cause fistulous tracts which open externally. Eventually the foot becomes much swollen, with a brawny, nodular induration, and with numerous fistulae discharging a thin sero-pus containing the characteristic granules. A rarifying osteitis of the bones is also present. The disease never heals spontaneously but progresses slowly without causing much cachexia. Eventually it terminates fatally unless it is arrested by proper treatment."

Winslow's description fits my case as a rubber glove fits the hand.

Holsey Brown, a colored man 39 years old, was born and raised in Georgia. He had never been out of the state except for a few months when he was an orderly in the Government Hospital at Tuskegee. He had done the customary work around stock, but had not gone barefooted since the age of fifteen. He gave no history of injury to his foot.

He was first seen by me on October 15, 1925, when he gave the following history of his illness: the trouble began three years before I saw him, when he first noticed a small, practically painless purple spot on the sole of his right foot. In a short time it began to look like a blister and he picked it with his pocketknife, noticing the escape of a dark gritty material. Shortly after this, other blisters formed and his home physician opened several of them. These areas increased in number and extent until the foot gradually became quite swollen and the site of a large number of sinuses. When I first saw him, the right foot was at least half again as large as the left, and the sole and external border were the site of at least a hundred small sinuses, many of which were covered over with crusts. The man had no temperature and very little pain. I laughingly told him when he demanded a diagnosis that he had madura foot. At that time I did not remember ever having read of the condition in America, and had no idea that it was a case of this rare disease.

My first thought was that the man had a syphilitic lesion, but the Wassermann was negative, and the patient was the father of numerous healthy children. My next thought was of malperforans. An x-ray plate showed a rarifying osteitis of several of the metatarsal bones, with erosion of two joint surfaces. The patient was not diabetic, and although his x-ray plates were not at all typical of tuberculosis I hoped that he had an atypical tuberculous process which would clear up after the removal of dead bone. With this possibility in mind, and the patient declining to submit to a total amputation, I did a partial amputation on October 24, 1925, leaving the great toe since its metatarsal bone was in good condition.

I realized that the trouble was not tuberculous when I examined the specimen in the gross. When I turned it over to Dr. Barrett, of the Pathological Department of the Macon Hospital, I again made the statement that it looked like nothing except madura foot, as I had heard it described at college, but that such a condition did not occur in America. Two days later Dr. Barrett returned the diagnosis of madura foot. This was confirmed a few days later by Dr. R. V. Lamar,

*Read in Section on Surgery, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

of the Pathological Department of the University of Georgia, who described it as of the black type.

The man up to the present has refused a complete amputation, although he is now after four years a cripple. His consent to amputation will probably come soon. He has had four doses of mercurochrome without benefit. The editor of the *Journal of the American Medical Association* advises against x-ray experimentation.

If any of the colleges represented here would like to take charge of the case and try any treatment before amputation, I am sure that the patient would answer in the language of Dickens, "Barkis is willing." Unless some other suggestion for treatment is made, I intend trying diathermy.

DISCUSSION (Abstract)

Dr. R. S. Leadingham, Atlanta, Ga.—Contributions like Dr. Harrold's demonstrate that such conditions may be found far removed from the locality in which they have been considered essentially provincial.

Dr. Joseph Colt Bloodgood, Baltimore, Md.—The organism of madura foot has been cultivated by Dr. Wright, of Boston, and I reviewed his work in 1899. There were about five cases in this countrv. No treatment was suggested in the article by Dr. Wright except removal of the lesion. He had tried everything else without success.

Dr. Harrold (closing).—The pathologist at our hospital, Dr. Barrett, has tried to grow this organism but has not yet succeeded. The patient lives forty or fifty miles away and has not been available for complete study.

THE NORTH CAROLINA SANITARY PRIVY LAW*

By G. M. Cooper, M.D.,**
Raleigh, N. C.

Some time ago a member of the State Board of Health was on a train coming into North Carolina from an adjoining state and was occupying a seat immediately behind an apparently wealthy and cultured woman and her daughter. The board member was attracted by an exclamation on the part of the older woman when she called out to her daughter, "Oh, we are in North Carolina now." "How do you know, mother?" responded the daughter. "Don't you see the pretty little houses? You do not see them so nearly everywhere except in North Carolina."

Now these pretty little houses did not just grow there like the golden rod by the roadside; but they are the result of a law requiring the construction of an approved type of sanitary privy at every residence in North Carolina within three hundred yards of any other residence. The plan has been carefully thought through and systematically and rigidly enforced.

On February 24, 1919, the General Assembly ratified an act now known as the state sanitary privy law. The full text of the law is here set forth. However, I shall read only two sections, Section 2 and Section 4, which are sufficient for this discussion.

(Chapter 71, Public Laws of 1919, as Amended by Extra Session, 1920, and Regular and Extra Sessions, 1921.)

AN ACT TO PREVENT THE SPREAD OF DISEASE FROM INSANITARY PRIVIES*

The General Assembly of North Carolina do enact:

Section 1. The term "privy" as used in this act shall be understood to include any and all buildings which are not connected with a system of sewerage or with septic tanks of such construction and maintenance as approved by the North Carolina State Board of Health, and which are used for affording privacy in acts of urination or defecation.

Sec. 2. No person shall maintain or use a residence, located within three hundred yards of another residence, that is not provided with sewerage, or with septic tanks approved by the North Carolina State Board of Health, or with a sanitary privy which complies in construction and maintenance with the requirements of this act: Provided, however, that nothing in this act shall curtail the right of a municipality to require and enforce immediate sewer connection.

Sec. 3. The North Carolina State Board of Health, through its officers and inspectors, shall fasten a license form on all privies within three hundred yards of the residence of any person other than that of the owner or tenant thereof during the last three calendar months of every year, when, on inspection, the said privy is approved by the officer making the inspection as constructed in a sanitary manner and to be in good repair, in accordance with reasonable rules and regulations to be prescribed by the North Carolina State Board of Health for sanitary construction and maintenance of privies. The said license shall apply to the calendar year following its issuance except as hereinafter provided.

Sec. 4. Every privy located within three hundred yards of the residence of any person other than that of the owner or tenant thereof, shall be maintained in a sanitary manner and in accordance with reasonable rules and regulations to be prescribed by the North Carolina State Board of Health and posted in suitable form inside of the privy by an officer of the said Board.

Sec. 5. The head of a family or household, the proprietor of a boarding-house, hotel, restaurant, or store, the principal or superintendent of a school, the agent or station-master of a railroad station or depot, or the person in charge of an office building, estab-

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*Read in Section on Public Health, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

**Director, Bureau of Health Education, State Board of Health.

(*Author's Note.—Since the foregoing paper was written the legislature of North Carolina has amended the sanitary privy law to the effect that the requirements for specific architectural detail in the construction of the privy house shall be recommendatory and not mandatory on the part of the State Board of Health.)

lishment, or institution, shall be responsible for the sanitary maintenance, as prescribed in section four of this act, of such privy or privies as may be used by his or her household, guests, customers, pupils, passengers, occupants, employees, workers or other persons.

Sec. 6. The North Carolina State Board of Health, through its officers and inspectors, shall exercise such supervision over the sanitary construction and maintenance of privies as may be necessary to enforce the provisions of this act.

Sec. 7. If an officer or an inspector of the North Carolina State Board of Health shall find a privy located within three hundred yards of the residence of a person other than that of the owner or tenant thereof, which is not constructed in accordance with the provisions of section three of this act, he shall securely fasten on the said privy a notice reading, "Insanitary; unlawful to use;" and if the inspector or officer of the aforesaid Board shall find, in the course of his inspection, a privy not being maintained in a sanitary manner and in accordance with the reasonable rules and regulations of the North Carolina State Board of Health for the maintenance of privies, he shall remove the license from the privy and securely fasten on the privy a notice reading, "Insanitary; unlawful to use."

Sec. 8. No person shall remove or deface a privy license or other official notice fastened on or in a privy by an officer of the North Carolina State Board of Health.

The State Health Officer of Massachusetts said recently that

"To initiate any project by legislation is likely to lead to misunderstanding and disaster, whether it be the return of the population to the farms or the descent or ascent of man."

While the North Carolina law was probably the first of its character to be enacted, it was by no means the initiation of the work. So the Massachusetts Health Officer need not be questioned in his opinion.

For exactly ten years previous to the enactment of this law the officials of the North Carolina State Board of Health and practically all of the city and county health officers in the State had been concentrating on the prevention of filth-borne diseases. The files of every small town newspaper in the State for a good part of that period would show columns and columns of stuff devoted to the destruction of the house fly and the prevention of typhoid fever and so on. During that period the city bacteriologist of Asheville had made some exceedingly interesting and important studies on the house fly question, which was of nation-wide interest. In addition, and probably most important of all, the old Rockefeller Hookworm Commission in executing its first million-dollar program for the South had carried on a state-wide campaign which reached every community in North Carolina, extending over a period of two or three years, which campaign had for its objective the prevention of hookworm infection through the proper disposal of human feces. This work was most important, because for the first time in the history of the State it made it possible for a physician or health officer to mention the word privy in ordinary conversation. The foregoing background of thorough preparation and discussion of the scientific interest of such a move made it possible to hammer the law through the General Assembly of 1919.

The stage being properly set for enforcement, the success of the law was guaranteed in the start for two additional reasons: (1) up to that time, and since the people of North Carolina have been convinced of the fact that when the North Carolina State Board of Health has a law enacted and starts out to enforce it, it does not mean maybe. (2) The second reason is that the man selected to head the bureau division responsible for the enforcement of the law is an artist and a man who believes in his job, being young and having a sound education in sanitary engineering and gifted with enthusiasm. The law has been enforced and would probably be harder to repeal than any other public health law in the State.

The oldest member of Congress in the North Carolina delegation in point of service and most influential member of the delegation, in a public campaign speech a few days before the recent election, stated that the three things which distinguished the State of North Carolina for the last twenty-five years were prohibition, transportation and sanitation. This congressman lives in a town of three or four thousand people, in a large wealthy county having a number of small towns in it. He and his friends have been able to observe more agreeable conditions near his home since the rigid enforcement of the law in his county.

From an aesthetic standpoint and the standpoint of common elemental decency the law is worth many times more than it could possibly cost. It has been executed with some friction, of course, but much less than was to have been anticipated. The chief objections have come from large land owners of cheap tenement rental property, because they have been forced to spend a little money in making sewage connection or installing sanitary privies.

I will not go into a discussion of the types of privies built, because it is sufficient to state that the type must conform to the last detail of the requirements of the State Board of Health; and the ten district inspectors and the two chief inspectors in the field all the time see that such is the case in every individual instance. For more

than two years past the execution of this law has resulted in the building of approximately 120 new sanitary privies each day. The inspectors are a uniformly sensible type of young men, and all of them take pride in their work and are known throughout the State as state sanitary officers. An important part, probably the most important part, in the execution of the law is the careful attention to the maintenance of the privies after they are built.

The courts have universally upheld the enforcement of the law when flagrant violations have been carried to the courts for settlement. Of course, the property owner is given a choice of several types of privies which would conform to the State regulation. But at present there are over 100,000 earth pit privies in service giving satisfaction, free from odors, and clean. Eighty-two per cent of all the privies under the jurisdiction of the State law are pits, and the pit privy built in conformity with the requirements of the State law costs on an average about $22.50. It is a completely satisfactory type for the average family.

This law has been enfored at an average cost of about 68 cents per privy. According to actual count since the law was first enacted, more than 184,000 open surface privies have been eliminated. These have been replaced by approved pit privies or by connection with the town sewage system. Since the law was enacted there have been 130 new sewage systems installed in the smaller towns in the State, and 126 new public water supply systems installed. There have been approximately 50,000 open surface privies eliminated by the extension of the town sewage system. The execution of this law has been the chief stimulant behind this great improvement in small town sanitation.

Discussion follows paper of Dr. Culbertson, page 660.

THE SANITARY PRIVY*

By W. R. CULBERTSON, M.D.,**
Norton, Va.

Definition.—To this audience it would seem indeed a foolish question to ask, "What is a sanitary privy?" And yet it is a fact that if the details of the construction of this important utility were asked for (and who will contend that such details are not germane to a proper definition) every one of you would give different specifications. I am glad to record that privy architecture is improving and that the subject will repay the health officer's consideration. My study of the sanitary privy has covered many angles of the subject during many years as a county and town health officer and my humility has increased with each attempt to solve the problem of the satisfactory type.

Historical.—The first reference in history to the sanitary privy is found in Deuteronomy 23, Verses 12 and 13 (I quote from the American revised edition of the Bible):

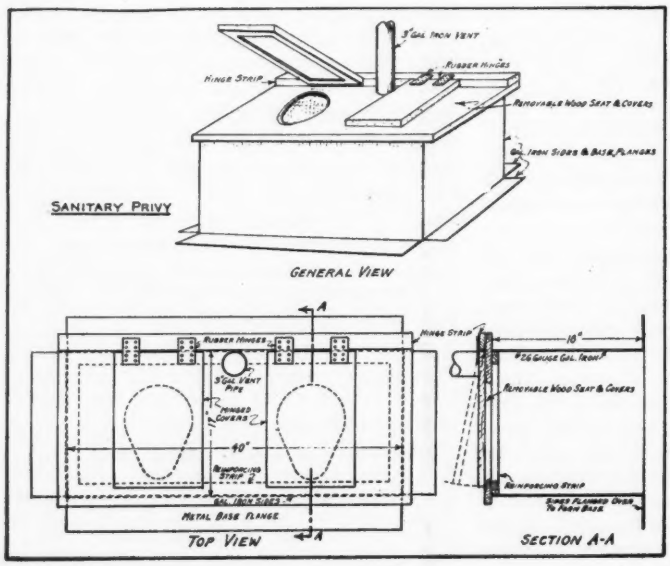
"Thou shalt have a place without the camp whither thou shalt go forth and thou shalt have a paddle among thy weapons; and it shall be, when thou sittest down abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee."

When we say, as we do in our Virginia Board of Health regulations, that a sanitary privy is a place of deposit of human excreta where it will not be accessible to animals or flies and will not endanger a source of drinking water, we have not improved one iota on the definition of Moses, the great law giver, in the verses quoted. But this definition will not suffice for privies in the towns, villages and industrial camps where people are crowded together on small plots of land and where the ground available for privy purposes is rarely amenable to the paddle treatment to which the sand of the Arabian desert yielded so satisfactorily.

The Essential Detail.—Though it is necessary generally that some sort of shelter be provided, to use the biblical phrase, "when thou sittest down abroad," it would be well clearly to understand that the shelter is not the privy. The privy is the place of deposit and a sanitary privy is the method or the arrangement whereby the material deposited is thereafter prevented from being a source of danger to the community. This method with the equipment necessary to apply the method differs with environment and circumstances. In some of the more isolated places in Virginia where the shrubbery grows near the humble homestead, the "squatting board" in the bushes often proves acceptable and is completely sanitary when properly maintained. A squatting board is simply a platform having a square hole in its center placed over a hole in the

*Read in Section on Public Health, Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

**County Health Officer.



ground, a lid being provided for the opening in the platform. The rural dweller through long habit is accustomed to squatting, and the seat so essential to the comfort of the urban population tends in the back-country citizen to inhibit nature's reflexes. This is the main reason for the filthiness of the county courthouse privy and public privies generally. The old-time farmer would not sit down on a privy seat. The squatting board to such primitive souls is the sanitary answer to his real problem. The use of this method is, I am glad to say, becoming more and more obsolete as time and progressive ideas get in their work. We all recognize, however, in this type of construction our familiar friend, the pit privy, in pioneer undress so to speak.

Practical Considerations.—Municipalities, for reasons having mainly to do with convenience and cost, may reasonably insist on the construction of a certain specified type of sanitary privy, but in rural districts this is not necessary or practicable. All privies to be sanitary must conform to the simple principles of the Mosaic code, and when they do, what county health officer is to say nay? What health reason can be alleged against any type of privy if the excreta disposal is safe? On the simple and essential principle of the safe disposal of human excreta, then what have we evolved in our architectural meanderings in and through and around the subject? For practical purposes we have been forced to consider, in addition to safety, topography of the land, character of the soil, congestion of population, shelter and seclusion, convenience, comfort, lasting quality, "foolproofness" and cost, the last three items being of special importance. The privy building or shelter may be as ornate as the fancy and pocketbook of the householder wishes to make it, or as simple as social background permits. The house, as has been previously indicated, is an unessential detail.

Manifestly privies in rocky, mountain hollows must differ somewhat from those in the open country. He who builds a privy in flat lowlands, in broad valleys and on the sea coast must take into account the water table so near to the surface, and in limestone areas of the hilly country the danger of polluting water supplies at a distance by human excreta must be recognized. A type of privy suitable to a scattered village is not adapted to closely settled communities. The privy must be placed where it least offends the eye and yet be not too far away to inhibit its regular use by all members of the household. It must be as comfortable as may be, which means, among other things, that it must be as free from objectionable odors as possible. It is important that the privy be of durable construction, built if possible to stay fly-proof for years under the rough usage of children and fools. The cost must be reasonable and the type capable of being manufactured in quantity.

Types.—Let me briefly note some of the types of privies as I know them. The pit type privy is the most universally satisfactory type for rural use. Five modifications of the pit privy are in use in Virginia.

The Common Pit Type Privy.—This has a single board floor with seat and riser nailed to the wall at back and ends over an unlined, limited capacity pit, fitted with the regulation ventilating stack, with dirt banked up at the back. It has a solid board hinged lid over the holes and a block behind the lid to make it self-closing.

This is a fair sanitary privy while it lasts, but it rarely lasts more than a year. The seat lid usually lasts a much shorter time. The privy house rots out at the bottom quickly, and falls to pieces when it is moved, as it must be, when the pit fills up. The short life of the privy, you will note, is due not only to strictly limited capacity of the pit but to the fact that the building is made an essential part of the privy, a great mistake. Later developments in privy construction overcome this fault, as indicated in succeeding types of pit privies. A privy as above described, if the old house can be utilized, can be remodeled and set over a pit at a cost of from five to ten dollars.

The Double Wood Slab Pit Privy.—This type has a strong, double-wood floor over a large pit lined from top to bottom, with seat, riser and stack strongly constructed, separate from the wall of the building. The seat is fitted with a light lid having strips of rubber tire casing for hinges.

This type lasts well and may be moved without injury to the essential parts of the privy building, which are floor, seat and riser. This type costs from $10.00 to $20.00.

The Reinforced Concrete Slab Type Privy.—This style has been evolved by the Virginia State Board of Health, and, though the initial cost is somewhat greater than the wood slab type, the lasting quality is infinitely greater. It is capable of being kept much cleaner and as the floor is built in sections it may be moved with little difficulty. Except for the concrete floor, it is essentially the same as the wood slab type just described. The contract price in Chesterfield County, Virginia, for a two-hole privy of this type, new house, concrete slab five feet by six feet by four inches (requiring two bags of cement) is $28.00. Recently two school privies of this type after two years' use were moved eight miles and set up again over new pits at a cost of $10.00 each.

The Concrete Vault Type Privy.—This type, with which I am familiar, is quite expensive, requires regular attention and the services of a periodical scavenger. This type is necessary, however, in certain sections of my bailiwick, where the solid rock formation inhibits periodical pit digging. The cost is from $35.00 to $65.00, depending upon size.

The Kentucky Type Septic Privy.—This is ill suited to the population of industrial and mining sections. The miners of my county and their families will rarely keep sufficient water in the tank. It is, however, a good type where knowledge, intelligence and discipline prevail in the household.

The Box and Can Privy.—This is the alternative to the pit privy wherever privies must be used. This type is never even passably satisfactory except where a regular scavenger service is instituted. The box and can system is fortunately usually the forerunner to a sanitary sewage system in towns and in the suburbs of the cities. This type is expensive to maintain; the scavenger system is always breaking down, the scavenger is a smelly and unesthetic nuisance, and this type tends to cure itself by creating a constant demand for something better, namely, a sanitary sewage system. The box and can privy has been evolved from the box-trough type formerly in use in those towns and cities which undertook to build fly-proof privies. This type still survives in some places, though the troughs are difficult to make water-tight and cannot be thoroughly cleaned.

An approved type of box and can privy consists of a box made of sound lumber at least five-eighths of an inch thick, with inside dimensions 20x20 inches, inside depth 16 inches. For a two-can privy the length should be 36 inches. The box serves as can receptacle, seat and riser. Battens should be placed on the underside of the unhinged top so as to keep it snugly in place. The oval hole should be 11x8.5 inches in size, and for comfort should be placed so that the front of the hole is 3.5 inches from the front edge of the top, which should have an inch overhang front and back (22x22). The hole should be provided with hinged lid 16.5x12 inches, hinged to clear five inches back from the hole. A lid both cheap, light and durable may be made of framework strips three-fourths of an inch thick, 1.5 inches wide, with ship-lap joints at corners covered by a board one-fourth of an inch thick. This kind of lid does not rest heavy on the back, nor does it gather moisture to any extent. At the rear of this box a square four-inch hole is made for a ventilator flue, which should be screened with 16-mesh copper wire. At the bottom of the box a row of auger holes should be bored which should also be screened. Into this box place the regulation standard galvanized privy can which is 15 inches in diameter and about 14.5 inches high. Made in quantities, the box, can and ventilator may be installed for seven or eight dollars.

The Chemical Commode.—This is simply a modification of the box and can privy, a chemical being used to disintegrate and deodorize the contents of the can, or larger receptacle, or tank, as the case may be. There are many designs of the chemical commode or vault on the market, and where they are maintained according to directions they are quite satisfactory. This type may be installed in the house proper just as the regulation water closet is. Chemical vaults are

more expensive than the privies previously described, costing from $50.00 to $100.00, according to size of tank and elaborateness of the other fittings. So much for the usual types of sanitary privies.

May I, in closing, offer for your consideration a galvanized sheet-iron privy seat and riser which I have found durable and cheap, and which may be used with any type of sanitary privy. This seat and riser has passed the experimental stage and may be readily made in quantity in any tin shop. It may be easily packed for shipment and is capable of being installed by any handy workman. Its specifications are as follows:

Base and riser are made of one piece 26 gauge galvanized sheet-iron, with 8 inch flange turned out at bottom, which rests on curbing of pit or floor if used for box and can type. Riser is joined together by crimping at back or end. It may be firmly fastened by four nails through the flange into curbing or floor. A one- or two-hole wooden seat with 2-inch reinforcing strip underneath fits snugly on riser and may be easily removed for cleaning. It is provided with seat covers made of thin board with a strip 1.5x0.5 inches around bottom edge which rests on seat, and are hinged to a 2-inch strip at back. A 3-inch galvanized iron ventpipe is fitted into an opening through the seat. This device can be produced in quantities at a cost of from $4.00 to $6.00 and has proven a very satisfactory solution of the privy problem in the coal mining villages of Wise County, Virginia.

DISCUSSION (Abstract)

Papers of Dr. Cooper and Dr. Culbertson.

Dr. John A. Ferrell, I.H.B., New York, N. Y.—When the Southern Medical Association met in Atlanta about twelve years ago, the question of whether or not the district or the county plan for local health organization should be adopted was discussed with animation. Time and experience have since settled the points about which there existed differences of opinion. Likewise there were heated discussions as to the type of privy which was safest and most practicable for the rural home. Again practical experience has settled the questions at issue. In the South at present there is little difference of opinion among public health officials as to the efficacy of the pit privy for most soil formations. It is not considered satisfactory for limestone formations or for areas where the ground water level is very near the surface or that are subject to overflows. Thousands of pit privies have been constructed in villages and rural communities. The typhoid fever rate in these communities has fallen rapidly and no cases have been recorded where a typhoid outbreak has been traceable to the pit privy.

When the North Carolina privy law was enacted, I had reservations about it, because I was not sure the people had been sufficiently educated to warrant law enforcement. Fortunately I underestimated the extent of the educational work that has been carried on. The law has been applied with success. Had it not been sound, it could not have survived. The figures with regard to the results in North Carolina are most extraordinary. Dr. Cooper stated that, on an average, 120 privies have been constructed daily at a cost slightly in excess of $22.00 per privy, or a total of $2,640.00 a day, exclusive of the cost of supervision. For 365 days this would mean an expenditure of $963,000. If construction has been at a practically uniform rate since 1920, when the law became fully operative, it would mean that between $6,000,000 and $7,000,000 has been expended by property owners in North Carolina for the construction of pit privies.

Although the efficacy of this work has been shown by the marked reduction in the death rate from filth-borne diseases, we find a large number of people interested in public health who have not been convinced that the pit privy is safe. A number of public health reference books in this country and abroad continue to show the familiar illustration of seepage from pit privies passing by easy stages to the well on the same premises. Those who object to the pit privy are disposed to ascribe the reduction in death rates to other factors. Of course, if the pit privy is an actual danger, they should be able to show an increase of typhoid fever where it has been generally adopted.

In view of the larger expenditures now being made in the construction of pit privies throughout the country, and in order to test the possibility of danger from them in any type of soil formation, it would seem desirable to undertake studies that will settle scientifically the questions which persist as to the possibility of pathogenic bacteria being carried from pit privies by underground water to nearby drinking water supplies. The study should be so thorough and so conclusive that the authors of the public health literature referred to will be ready to make any indicated modification that would be warranted as a result of scientific observations with regard to what happens underground, especially if the findings are supported by a reduction in the morbidity and mortality rates for the filth-borne diseases.

Dr. M. A. Fort, Bainbridge, Ga.—When you try to instruct a man in the country how to build a pit privy, it is best to take along a small model in three parts. First, get four 2x4's the proper length and wall them up with rough planks on ends and sides, the proper length and breadth. The top planks must have their top edges in the same horizontal plane all around. The pit is dug, and this curbing is dropped in as a unit.

Second, make the floor and seat as a unit, fly-tight, and let the heavy end and side pieces slip down over the curbing like the lid of a pasteboard shoe box.

Third is the house, which rests on the extended ends of the platform sills.

Many men of little mechanical ability will be confused by a drawing, but if you show them the curbing, then show them the platform seat and fit it on the curbing, then show them the house, and how it fits over all, they can build without further instructions.

The lid which the essayist showed, made of a framing of 1x1 inch stuff covered over with beaver board or very light thin boards, is much better than a lid made of a solid heavy plank, because under the plank the seat often becomes wet, mouldy, cold and slimy, and then the toilet will not be used.

If urinals are not built in the boys' toilets at country schools, the seats will become so soiled in three days that they will be no longer used. A good plan is to build a wooden trough at one end of the privy, waist high at the outer end, and running down and entering through the front wall of the seat. Close this entrance

tight, excepting about two inches in the bottom of the trough where the urine runs through. With a few large nails driven inside the trough, make a grating where the trough passes through the front wall of the seat. Next nail a piece of galvanized sheet-iron or roofing on the wall, letting it extend down and line the trough. Nearly fill the lower part of this trough with smooth pebbles, which are kept from rolling on down into the pit by the grating.

Another good urinal is made by digging a hole, deep if in stiff land, or shallow if in sandy land, filling the hole partly with cinders, stand in the cinders a piece of terra-cotta road culvert, and fill nearly full of cinders. Of course, good manufactured urinals can be bought, but I am talking for the health officer who must build cheaply, or not at all.

Dr. S. W. Welch, Montgomery, Ala.—Alabama debated following North Carolina's lead on this point. We were afraid to do it, because North Carolina had not gone far enough for us to know whether or not the privy law would work.

The trend of typhoid fever since the privy law is most enlightening. Recently some of the members of my staff were in North Carolina studying the details, and as a result of that study we shall introduce in the legislature a law similar to the North Carolina law.

Dr. W. K. Sharp, Jr., Nashville, Tenn.—We have wasted, and are continuing to waste, valuable time by arguing with the public the different types of sanitary privies. North Carolina has taken a constructive step along this line. It is not wise to take such a step until your state board of health has sufficient personnel to supervise a sanitary privy law.

If we expect to have privies built properly, we must have legislation. In Tennessee we found what we believe to be the best legislation in the country. The county boards of health have authority to pass regulations that have to do with sanitation, and recently in one of our counties where we have a full-time sanitary officer (I wish to emphasize the fact that this man is under the supervision of the county board of health, and this board of health's president is a physician) the county board of health met and passed its own regulations at the recommendation of the State Department of Health. They immediately put machinery into motion to serve notices on the public that they would be required to build sanitary privies. At the expiration of nine months' time we discovered that about 80 per cent of the rural homes had constructed reasonably good sanitary privies. We did not require a certain type of privy, but sent out notices that the open privy was declared a nuisance, and with this notice we sent a bulletin showing them how to construct a common sense practical privy. Some of the privies will have to be rebuilt in a few years, but in the meantime the greater portion of the population of that county is protected from diseases that are transmitted through human excreta.

The box under the seat should be made of good lumber, and should be fly-proof. The house is secondary. You do need a good roof on it for the protection of the privy seat. It costs very little to build a privy of this type, and it certainly will give protection against typhoid fever. We should stop misleading the public by giving typhoid inoculations without doing sanitation. Temporary protection from typhoid is obtained by inoculation, but this gives no protection against dysentery, and neither does it take the place of sanitation.

Dr. Roy K. Flannagan, Richmond, Va.—Notwithstanding my heretical views on the training of health workers, every county board of health in the State of Virginia is composed largely of physicians, duly licensed, and all the health work in Virginia is under medical supervision, though we have many highly competent lay health workers. We also have a compulsory sanitary privy law in Virginia.

Mr. H. E. Miller, Raleigh, N. C.—There have been many who claim that the only important thing in privy installation is to have a pit dug. It took us three or four years to be thoroughly convinced that that is wrong. We permitted all kinds of buildings to be overhauled, but we found that for permanence the buildings must conform to certain requirements.

If privies are to be satisfactorily maintained, they must be free from odor, they must not be objectionable to the user, and they must be properly ventilated. They must be comfortable, must have properly constructed seats. In the old privies the seats are 12 or 14 inches wide. Nothing short of a 24-inch seat will be comfortable and lasting.

Finally the matter of personal pride in the thing which they have is of great importance. If you give people something they can be proud of, it offsets the additional cost they have to pay.

Dr. Ferrell and Dr. Welch have raised a question. The typhoid fever death rate is still too high. Some further reduction by complete privy sanitation with effective maintenance may be expected. The only recognized epidemics that have occurred in recent years have been milk-borne. There is probably much more incidence due to infected milk supplies. With the development of modern civilization, health agencies are faced with materially changed problems of sanitation. Principally on account of the automobile, the population is more mobile. Formerly the environment of an individual might be circumscribed by the corporate limits of the city or town in which he resided. Now the scope of the environment which it is necessary to regulate for his adequate protection embraces the length of the highways in all directions.

The typhoid death rate based on the population of incorporated areas is the nearest actual measure of the reduction effected by privy sanitation that can be based on an official bureau of census population figures.

The urban colored rate for typhoid deaths has particular significance, since the colored population is exposed to the dangers of defective privy sanitation to a far greater extent than is the white population. Prior to 1919, exceedingly few colored people enjoyed the privilege of a public water supply and sewage service. Now little distinction is made in planning extensions or new systems. Another factor in the colored typhoid rate is the high percentage of contacts, which is partially due to the fact that, as a race, they fraternize and congregate to a much greater extent than white people.

No true measure of the actual effect of the sanitary privy can be had on any official census basis available.

Reference was made to vaccination. You know where the principal part of your vaccination goes: to the rural population. Yet the white urban rate has fallen to 4.9, and I believe I am correct in stating that North Carolina is one of the few states, if not the only state, that did not suffer a rise in the typhoid death curve for 1925.

Mr. H. G. Tuggle, Memphis, Tenn.—About one year ago the Shelby County Commission decided to adopt the pit type of privy with concrete slab and concrete seat riser as a standard method of excreta disposal for the rural sections of the county.

For several years the county had provided and maintained a cart or wagon service for feces removal in a territory of approximately thirty-five square miles surrounding the city limits of Memphis. Of course, we are all familiar more or less with the disadvantages of this system of sewage disposal and our county certainly had its share of troubles. However, the Shelby County Health Department is at present working on a plan that will possibly eliminate the old system in two years' time.

The final plan as adopted by the County Commission through the County Health Department was to employ the necessary personnel and labor, also to purchase the amount of equipment needed to complete the installation of every part of the pit privy, except the house. It was found that this part of the installation could be completed by the county in mass lots or in wholesale quantities at a cost of $6.50 per single seat riser installed.

Possibly it would be interesting to many of those present to know just how a piece of work of this kind could be done at such a low and reasonable cost. First, all materials are obtained in car lots or in large quantities at a very low price. Second, wood forms for curbing pits and wood seats for the concrete seat risers are made at the County Workhouse by prisoners working under the supervision of competent foremen. Third, all concrete slabs and concrete seat risers of unit construction are precast at three different locations in the county by a trained crew of workhouse prisoners with one of the big concrete mixers owned by the county. The crew of ten men making concrete slabs can make from one hundred to one hundred and twenty-five regular size concrete slabs (5 feet long by 4 feet wide and 4 inches in thickness) per day.

The cost of materials as obtained by the county are as follows:

Concrete gravel, $1.50 per ton; cement, 60 cents per bag; three-eighths inch reinforcing steel bars, $52.00 per ton; lumber for curbing pits, $15.00 per thousand board feet; lumber for making seats, $47.00 per thousand board feet.

The cost per single privy seat is charged as follows:

Concrete slab, $2.50; seat top, 35 cents, 10 feet by 4 inches in diameter; 26 gauge metal vent pipe, 65 cents; dig pit, $1.00; board or curb pit, 50 cents; place slab, $1.00; inspector's time, 50 cents, or a total charge of $6.50 for installation complete and in place.

A foreman, two truck drivers, a crew of eight laborers and two five-ton trucks are kept busy making installations in the county areas. This crew of men has installed as many as fifty concrete slabs in one day's time and the average has been about thirty slabs per day since the work was first started.

Since January 1, 1926, over 3,000 pit privies with concrete slabs have been installed in the county rural and suburban sections, and the work really was not begun in earnest until April 15, 1926.

We have no law in Shelby County compelling the property owners to install a pit privy of any type. Only two inspectors of our division have been actively engaged in building the 3,000 privies previously mentioned. We had to rely on the ability of these two inspectors as salesmen, as we have no sanitary privy law. We are glad indeed that we selected the concrete floor type, for we feel that this type is far superior to the wood floor type, and also is much better liked by the people than any other structure of the same cost.

We admit that our experiences are limited and that we have much to learn.

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EDITORIAL DEPARTMENT

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PRE-DISEASE DIETS IN PERNICIOUS ANEMIA

In secondary anemias in animals certain foodstuffs added to the diet have a very evident effect upon the rapidity of blood regeneration. The effect is so marked that it has seemed easy to control blood formation by dietary variations; and from experiments upon animals it was suggested that human anemias might be treated with the same foodstuffs. Certain animal organs, liver, gizzards, and many of the commonly unpopular, inexpensive and discarded "lights" of the beast or fowl are potent in raising the hemoglobin of animals with experimental secondary anemia; and when used with a special diet apparently produce remissions in human pernicious anemia.[1] The clinical improvement of the patient with improvement of the blood picture has been marked by many physicians in the last one or two years.

Many diets have in the past been advocated for pernicious anemia, which combined with rest in bed apparently improved the case. However, nothing has had the effect of the high liver, low fat, green vegetable diet advocated by Minot and Murphy.[1]

An intestinal origin for pernicious anemia has been claimed over and over again. Intestinal infestation with bothriocephalus latus produces the picture of pernicious anemia; sprue may produce it; and intestinal parasites such as hookworm produce profound secondary anemias. The origin of pernicious anemia is generally regarded, however, as not proven.

The diet over many pre-disease years of the anemic patient may throw some light upon the subject. A very thorough recent dietary study of twenty-six patients has some special value[1] in this connection.

The diet history was obtained by careful questioning of the patients, and confirmed by conversation with the relatives and associates. Most of the patients were breast-fed in infancy. The diets were usually low in vitamin C, and their mineral content was perhaps inadequate. The proportion of fat was high, and rather large amounts of white bread were used by all. The achlorhydria which is constant before pernicious anemia might bear a relation to the high fat intake.

A low cholesterol value is usually found in the blood of pernicious anemia patients, and cholesterol is an antihemolytic substance. The high fat fraction of the blood, it has been suggested, may be from hemolytic lipoids.[2]

The average pre-disease diet of the pernicious anemia patient did not differ markedly from that of his associates who did not develop the condition.

The pre-anemia diets reported by Cornell were, however, by no means the ideal as recommended by present day dietary experts. It is possible that with improvement of feeding customs, according to modern theories of nutrition, the disease may be entirely prevented and become unknown.

1. Editorial: Diet in Pernicious Anemia. S. M. J., 20:168, Feb., 1927.

NEUROSES OF CHILDHOOD

Science in Russia, from a recent series of articles in the *British Medical Journal*, is progressing, though under financial handicaps. The elevation or deification of science is part and parcel of the Soviet philosophy, and all scientific institutions are supported by the State. The leader in medical science for many years, according to Gantt,[3] has been Pavlov, the physi-

1. Cornell, B. S.: A Study of the Pre-Disease Diets of Patients with Pernicious Anemia. Johns Hop. Hosp. Bull., 40:409, June, 1927.
2. Gibson, R. B., and Howard, C. P.: Metabolism Studies in Pernicious Anemia. Arch. Int. Med., 32:1-16, 1923.
3. Gantt, Horsley: Medical Review of Soviet Russia. Brit. Med. Jour., p. 533, Sept. 20, 1924. Ibid., p. 1070, June 11, 1927.

ologist, founder of a school of psychologists who, while following his ideas, have developed largely on the lines of the behaviorist school of psychologists in America. The work and reasoning of his followers is similar in many respects to that described by Watson,[1] leader of the American behaviorists.

Introspection is wholly avoided and the response of the subject to given stimuli, the "conditioned reflexes"[2] is observed. The fact that salivary secretion of the dog occurs after the apparently psychic stimuli of the sight of food, or the step of the person who usually brings it, has been long known. Food in the mouth is not necessary. The salivary flow is a simple conditioned reflex: it regularly occurs after the conditioning visual or auditory stimulus. Cats, rabbits, fish, children, adults, any animals have many conditioned reflexes. They learn to expect benefit or danger from a certain noise, odor or other stimulus, and their life habits are made up of conditioned reactions and conditioned inhibitions. Religion, Pavlov calls the highest of the conditioned reflexes.

An experiment with dogs was to train them to expect food after the sound of a metronome of a certain number of beats, say 150. They were positively conditioned to that beat. Then they were trained to expect no food after the sound of a metronome of a different beat, perhaps 90. They were negatively conditioned to that sound. The tones were brought closer together so that the problem of distinguishing between them became increasingly difficult, and the response of the different dogs was varied. Many became excited and irritable; some showed complete inhibition and went to sleep. By his studies, Pavlov believes he has discovered the nature of sleep and neurasthenia, both of which he produced artificially in dogs by giving them too difficult problems of differentiation.

Krasnagorski,[2] who has repeated upon children Pavlov's dog work, reported his studies upon the "physiology of the cerebral hemispheres" in the *American Journal of Diseases of Children*. He remarks of the behaviorists: "The American penetrating and practical mind saw that it is more profitable to know precisely the visible and external reactions of the organism than to be imagining its internal psychic processes." He deals with the conditional reflexes of children.

A normal child's reactions are much more quickly conditioned than those of a lower animal. A six-year-old child was conditioned to expect food and to open its mouth at a certain beat of the metronome. Then he was conditioned not to expect food at another beat. He was required to make increasingly difficult distinctions, like the dogs, as the beat of the metronome without food became more similar to the one with which he expected food. The conditioned reaction became slower, and the child became nervous. He had been well behaved before, but now when outside the laboratory he was cruel, cried often, beat the other children, and wanted to leave the hospital. He could make no new differentiations of sound, and the old ones which he had, had disappeared. He yawned in the laboratory, and went to sleep, which he had never done before. A general inhibition thus developed from the too intensive conflict between stimulus and inhibition.

A popular lecturer upon psychology told the tale of an educated pair of parents with a six-month-old baby. A guest came to dinner and at ten o'clock was invited to "come and see the fun." The baby was awakened, his bottle put almost into his reaching lips, and then quickly pulled away. He bore it for a few moments good naturedly, then with mild struggling, then broke into vociferous yelling, and was given the prize. This was a simple and unintentional laboratory experiment in conditioning reflexes. The child shrieks and receives his bottle. It soon becomes a reflex to shriek, because food accompanies shrieking.

In dealing with the neuroses of childhood, as in dealing with disordered digestive functions, only the parent need be trained. The child is psychically as well as alimentarily a prey to his environment. The origin of likes and dislikes of childhood as conditioned reflexes should be more carefully studied by their parents.

1. Watson: Behaviorism. New York: People's Institute Pub. Co., 1925.
2. Krasnagorski: The Conditioned Reflexes and Children's Neuroses. Amer. Jour. Dis. Child., 30: 753, Dec., 1925.

RABBIT RESPIRATORY EPIDEMICS

The hutch rabbit is a "wretched and sickly little beast," as an English writer has said, and, as is well known, is the subject of many laboratory experiments. Spontaneous pyelitis has been observed in a large percentage of rabbits. A respiratory infection which is found in conservatively half the rabbits kept for laboratory pur-

poses is the cause of 50 to 75 per cent of the total rabbit mortality. Symptoms of the infection, which is caused by *Bacillus lepisepticum*, are snuffles, a white purulent nasal discharge, matted paws, heavy breathing and sneezing.[1]

A study of the epidemiology of the disease at a rabbit farm, where different breeds of rabbits were separately maintained, may throw some light upon the epidemiology of human infections.

Individual rabbit resistance under exactly similar conditions varied. Some animals developed pneumonia and septicemia, others a local nasal infection, "snuffles," others became healthy carriers, and a few remained unaffected. Pregnant females with lowered resistance frequently served as foci of infection. Resistance of the different breeds varied considerably. Infection did not seem to be an effect of virulence of the microorganism, but of host susceptibility and size of dosage. There was a spring and fall rise of the condition.

In epidemics in general, Webster and Burn[2] think, the theory of fluctuating microbic virulence may be discarded.

If one broadly interprets this study in terms of respiratory infections among groups of people, susceptibility to the common "cold" is probably hereditary; but the most resistant individual is liable to succumb when exposed to massive dosage of infection.

GATEWAY TO SOUTHWESTERN, THE COLLEGE OF THE MISSISSIPPI VALLEY

Memphis—Where We Meet

EDUCATION AND RECREATION*

Memphis, Tennessee, has one of the best public school systems in the South, with four high schools and twenty-two grammar schools for white students and one high school and fifteen grammar schools for negroes. There are 32,666 children enrolled in the public schools.

There are many flourishing private and parochial schools with a grammar and high school course.

Southwestern, a standard Class A college of arts and sciences, has just completed its first year's work in Memphis, having been transferred to this City from Clarksville, Tennessee, where it had been in successful operation for fifty years. The college buildings are of stone and are among the finest samples of college architecture in America. It is owned and controlled by the Southern Presbyterian Church, Synods of Tennessee, Mississippi, Louisiana and Alabama.

Three branches of the University of Tennessee are located in Memphis: the College of Medicine, the College of Dentistry and the School of Pharmacy. An extensive building program for these units is in progress.

West Tennessee State Teachers College with a standard four-year course is located at Normal, Tennessee, just outside the city limits of Memphis.

The University of Memphis Law School operates successfully and has a record of progress and growth.

There are a number of good business colleges.

Two public libraries are maintained. They are the Cossitt Library, a circulating and reference library with branches throughout the city, and Goodwyn Institute Library, an endowed institution which maintains a high grade refer-

1. Webster, L. T.: Spread of B. Lepisepticum Infection at a Rabbit Farm in New York City, N. Y. Jour. Exper. Med., 45:529, March, 1927.
2. Webster, L. T.; Burn, Caspar: B. Lepisepticum Infection. Mode of Spread and Control. N. Y. Jour. Exper. Med., p. 911, May, 1927.

*From the Publicity Division, Mrs. Percy Finlay, Director, Memphis Chamber of Commerce.

ence library, and lecture course free to the public. It annually brings to Memphis the best known men and women on the lecture platform.

An annual season of grand opera is made possible by the Civic Music League. Other musical attractions are on the recreation program.

Memphis is well equipped with motion picture houses and theaters.

Parks, playgrounds, country clubs, baseball, football, tennis, swimming, hunting and fishing take care of outdoor activities.

Book Reviews

How to Make the Periodic Health Examination. By Eugene Lyman Fisk, M.D., Medical Director, Life Extension Institute, and J. Ramser Crawford, M.D., Assistant Medical Director, Life Extension Institute. 593 pages, illustrated. New York: The Macmillan Co. Cloth, $4.00.

Because throughout special forms of the Life Extension Institute are used to record the findings, the book will be of limited use to the average physician.

The methods of examination are as a rule adequately presented, except the section given to diseases of the circulatory system.

The more technical methods of examination are so frequently advised that unless one were associated with a modern hospital or fully equipped clinic he would have to omit a large part of the examination.

The advice to the patient after examination has been completed is in the main good, but is too didactic for the physician not associated with the Life Extension Institute to follow.

In its present form the book will be of small value to the average physician.

City Health Administration. By Carl E. McCombs, M.D., National Institute of Public Administration and New York Bureau of Municipal Research. 524 pages. New York: The Macmillan Co. Cloth, $5.50.

The book is written primarily for the educated layman. But it is certainly a careful and painstaking presentation of the subject.

As a textbook in graduate schools, it will certainly be welcomed. It can be studied with profit by all those interested in municipal public health.

The International Medical Annual. A Year Book of Treatment and Practitioner's Index. Forty-Fifth year, 1927. New York: William Wood & Co. Cloth, $6.00.

In a condensed form the important contributions to medicine during the previous year are presented. The subject matter is truly international in scope.

The work of Minot and his associates, however, is not mentioned under pernicious anemia.

For a general survey of all branches of medicine, this annual is of great value, and as the diseases are arranged alphabetically it is a handy reference.

Heart and Athletics. Clinical Researches Upon the Influence of Athletics Upon the Heart. By Dr. Felix Deutsch, Privatdocent in Internal Medicine at the University of Vienna, and Dr. Emil Kauf, Assistant at the "Heart Station" in Vienna. English Translation by Louis M. Warfield, A.B., M.D., Formerly Professor of Clinical Medicine at Marquette University Medical School; formerly Professor of Internal Medicine, University of Michigan; Member Association of American Physicians, etc. 187 pages. St. Louis: C. V. Mosby Company. Cloth, $2.50.

The question of the effects of athletics on the heart has been a moot subject for a long time; and this study was undertaken to throw some light on this matter. Because it removed the personal factor, the authors base their conclusions on the size of the heart determined by orthodiagraphic and teleoroentgenographic measurements.

They conclude that moderate athletics do not affect the size of the heart; that there is a difference depending upon the form of exercise, enlargement being more frequent in rowing, bicycling, and skiing; that cardiac enlargement is less frequent in swimming, fencing and foot ball (soccer); that the enlargement is rarely found in children or women engaged in athletics; and that the enlargement is due to dilation.

The standards that they accept as normal are lower than those in common use.

Malarial Psychosis and Neurosis, Their Medical Sociological and Legal Aspects. By William K. Anderson, M.D., F.R.P.S. (Glas.), Visiting Physician to the Eastern District Hospital, Duke Street, Glasgow; Recognized Teacher of Clinical Medicine, Glasgow University; Visiting Physician to the Mental Observation Wards, Strobhill Hospital, Glasgow; Professor of Mental Diseases to the Anderson College of Medicine, Glasgow; Certifying Physician in Lunacy, Glasgow Board of Control; Late Medical Officer to the Dykebar Military Mental Hospital, Paisley; Late Neurologist to the Ministry of Pensions, Glasgow. 18 figures and 4 colored plates, 395 pages. New York: Oxford University Press. Cloth, $13.00.

The earlier sections of the book are devoted to the malarial parasite and to the general symptoms of the disease. These are followed by chapters on "Malaria in History" and "Effects on Character and Race Degeneration". The portion on pathology caused by the malaria parasite is a model in clearness and thoroughness.

The importance of malarial infection not only in its immediate effects but it its sequellae is ably presented.

The chapters on the different mental and nervous manifestations of malaria are discussed in great detail with case reports as illustrations. There is an extensive list of references and authors appended. The book is a real addition to the literature on malaria.

Should We Be Vaccinated? By Bernhard J. Stern, Instructor of Sociology, Columbia University. 145 pages. New York and London: Harper & Bros. Cloth, $1.50.

A better name for this book would be a history of vaccination, for the author has carefully covered the subject from before Jenner to modern times. It shows extensive study of the literature, and the extracts from those in favor of and against vaccinations are full of interest.

Tropical Surgery and Surgical Pathology. By Karuna K. Chatterji, F.R.C.S.I., Major, I.T.F. Medical Corps, Surgeon, Medical College Hospitals, Calcutta; late Surgeon and Teacher of Surgery and Dermatologist, Campbell Hospital Medical School, Calcutta; Fellow of the Royal Society of Medicine, London, and of the Royal Society of Tropical Medicine, London; Member of the Bio-Chemical Society, London; Examiner in Surgery, Calcutta University. 244 pages with 91 plates, 20 in color and 5 charts. New York: William Wood and Co. Cloth, $6.00.

Rapid means of transportation have made local diseases a thing of the past and the World's War has brought tropical diseases within the practice of many physicians of the temporate zone.

Throughout this book the clinical pictures presented are clear and their pathology is discussed in full.

Because of its importance amoebiasis is fully considered and the accepted operations for abscess of the liver are described in detail. The author prefers aspiration and irrigation to more radical methods and describes his own technic based upon a a large number of cases.

Filariasis is another subject covered completely; and also the operative procedures in elephantiasis are well presented.

The discussions of "Tropical Granulomata", Shistosomiasis goundou, pes gigas and the junxta articular nodules, are adequately covered.

The chapters on "Neoplasm in the Tropics" form interesting reading.

The inclusion of a chapter on "Saline Solution in Cholera" seems somewhat out of place in a manual of surgery.

There is a real place for such a book.

Community Health Organization. Edited by Ira V. Hiscock, Assistant Professor of Public Health, Yale School of Medicine, with assistance of others. 122 pages. New York: American Public Health Association. Cloth, $2.00.

The American Public Health Association considered the question of the organization of the health departments of cities of 100,000, 50,000 and 20,000 at its last meeting, and the result of its findings are published in this volume.

The matter of organization is fully covered, but it is surprising that the board of health as recommended by them should consist of four laymen and one physician.

The question of budgeting is clearly covered and the expenses allowed are in keeping with the usual practices. It is interesting to note that the public health nurses make 15 per cent of the cost of their department by charges to those able to pay.

The use of such a book is limited, but it will be of service to those especially concerned with the question of community health administration.

The Medical Clinics of North America (Issued serially, one number every other month). Volume 10, Number 6 (Heart Number, May, 1927). Octavo of 211 pages with 101 illustrations and complete index to Volume 10. Philadelphia and London: W. B. Saunders Co. Per clinic year, July, 1926, to May, 1927. Paper, $12.00; cloth, $16.00, net.

The larger part of this number of the clinics is given to the "Seminar on Diseases of the Heart" conducted under the auspices of the Philadelphia County Medical Society during the fall and winter of 1926-27.

Thomas McCrae's clinic on "The Circulation in Relation to Surgery" is well written. James M. Anders' clinic on "Angina Pectoris" is disappointing, because it is hard reading.

It is to be regretted that a section on treatment was not included in Charles C. Woolforth's clinic on "Heart Failure, Acute and Chronic," for this is something that is not covered satisfactorily in most textbooks.

Eugene P. Pendergrass' clinic on "The Value of An X-Ray Examination in the Interpretation of Heart Lesions" is too loosely written, considering the space allotted to it.

As a whole, the clinics are satisfactory, but the present number is not up to the standard usually expected of this publication.

Lippincott's Pocket Formulary. By George E. Rehberger, M.D. Philadelphia and London: J. B. Lippincott Company. Cloth, $3.50.

Diseases are arranged alphabetically and prescriptions and general directions for their management are placed under each heading. The advice is in the main good, but polypharmacy is used more than is customary at present.

There is a list of the drugs of the U. S. P. added with their dosage; and a section is given to infant feeding.

Southern Medical News

ALABAMA

The Seale Harris Clinic announces to the medical profession that Seale Harris, Jr., B.S., M.D. has been appointed Resident Physician to the Gorgas Hospital. Dr. Harris was graduated at Johns Hopkins in 1926.

The Gorgas Hospital has been accepted unqualifiedly as a Class A hospital by the American College of Surgeons. The physician who inspected it said: "The standards of the Gorgas Hospital are far above the requirements of the College of Surgeons." The Gorgas Hospital has also been passed upon favorably by the American Medical Association as "an approved hospital for interneship." An interne will be appointed later.

Dr. Richard V. Taylor, Jr., formerly of Mobile, a missionary in China for some years, has returned to this Country to enter private practice in Memphis, Tennessee.

Jackson County has maintained a health unit comprising a physician, nurse, sanitary inspector and secretary, with the assistance of the state and federal governments.

Deaths

Dr. William Hinton Wilder, Birmingham, aged 64, died June 7.

ARKANSAS

Dr. C. W. Garrison, of Little Rock, State Health Officer, has stated that the service rendered by the physicians of Arkansas during the recent flood emergency was so efficient that the sick rate in the inundated areas was lower than during normal times. Dr. Garrison, in speaking on public health, emphasized the need of a closer relationship between the physicians of the State and the Health Department.

Lincoln County Medical Society has elected Dr. J. M. McClendon, President; Dr. A. C. Thiolliere, Vice-President; Dr. Chas. W. Dixon, Secretary.

Mrs. Delia Hanna, R.N., who has been doing special work in anesthetics at Grace Hospital, Detroit, Mich., and in clinic work at Greenville, Miss., is the new Superintendent of the Helena Hospital Association, Helena.

Deaths

Dr. Augustus Samuel Clayton, Emerson, aged 94, died May 5 of pleurisy.

DISTRICT OF COLUMBIA

The American Board of Otolaryngology conducted an examination at Washington on May 16 and 17. Of the 142 men examined, 119 were passed and 23 failed to pass the examination. The next examination will be held in Detroit, Mich., on September 12. Applications for examination should be sent to Dr. H. W. Loeb, Secretary, 1402 South Grand Boulevard, St. Louis, Missouri.

Dr. William A. White, Superintendent of the St. Elizabeth's Hospital, was honored by a dinner given by the staff of the Hospital as an expression of mutual good-will and friendliness.

Dr. Charles W. Richardson, Washington, a trustee of the American Medical Association, was awarded the honorary degree of Doctor of Science at the recent commencement of the University of Pennsylvania. Dr. Richardson received a similar honor from George Washington University in 1921.

Deaths

Dr. Rose Kidd Beere, Washington, aged 68, died May 19 of chronic myocarditis.

FLORIDA

The honorary degree of Doctor of Science was conferred upon Dr. J. L. Kirby-Smith, Jacksonville, by the University of the South, Sewanee, Tennessee, at its recent commencement.

The Palm Beach Academy of Medicine was recently organized at West Palm Beach and elected Dr. W. E. Van Landingham, President; Dr. John E. Hall, Vice-President; Dr. Lloyd J. Netto, Secretary-Treasurer.

Dr. William N. Parkinson, St. Augustine, was recently named Chief Surgeon of the Florida East Coast Railway, succeeding Dr. J. N. Fogarty, who resigned.

Deaths

Dr. Harry Doutrick, West Palm Beach, aged 73, died April 9 of chronic cholecystitis.

Dr. Nathaniel McClinton, Jensen, aged 90, died May 22 at Saginaw, Michigan, of chronic myocarditis.

Dr. Louis W. Toles, Orlando, aged 64, died May 4 at the Orange General Hospital of uremia and chronic nephritis.

Dr. Bedford Eugene Vaughan, Willow, aged 59, died May 11 at a hospital in Tampa following an operation.

GEORGIA

Second District Medical Society has elected Dr. C. J. Jenkins, Edison, President; Dr. J. A. Redfearn, Albany, Vice-President; Dr. C. H. Watt, Thomasville, Secretary.

On May 20 and 21 the Society of Neurological Surgeons held its annual meeting in Atlanta as the guest of Dr. Charles E. Dowman.

After being used for years for the technical courses of the Boys' High School the historic structure which formerly was a part of the Medical Department of the University of Georgia, Augusta, has again been turned back to the Medical School. The building will be remodeled as a home for the Richmond County Medical Society, which will be reorganized as an Academy of Medicine.

The south wing of the Medical Department of the University of Georgia, Augusta, which was used as the surgical department, was damaged by fire on May 8.

According to announcement of Dr. C. C. Jarrell, Atlanta, $2,500,000 has been put into hospital construction for the Methodist Episcopal Church, South, during the past year.

Upon motion of Dr. E. C. Thrash, the Medical Association of Georgia, at a recent meeting, unanimously endorsed the Parks Memorial Campaign which has for its object the erection of a memorial hospital at the Georgia State College for Women at Milledgeville. The Fulton County Medical Society had previously endorsed the movement.

Dr. Frank K. Boland was elected President of the University of Georgia Alumni Society at a meeting in Athens recently.

Dr. Stewart R. Roberts was recently appointed a member of a committee by the American Medical Association to reconsider the question and draft resolutions concerning the reintroduction of heroin into the Pharacopeia.

Dr. T. J. McArthur, Cordele, a past President of the Medical Association of Georgia, was recently elected President of the Emory University Alumni.

Dr. J. E. Paullin, Atlanta, was elected Chairman of the Section on Medicine of the American Medical Association at its recent annual meeting.

Dr. C. C. Aven has been elected to the Executive Board of Grady Hospital (White Unit).

Dr. M. M. Burns was recently elected to the Board of Education of the City of Atlanta.

Dr. Robert L. Tye, McDonough, sailed for Europe with Dr. George W. McKenzie's group for a six weeks' course in eye, ear, nose and throat work at Vienna.

Dr. George Aubrey Williams and Miss Virginia Stone Williams, both of Atlanta, were married June 4.

Deaths

Dr. J. H. Knight, Egan, aged 74, died June 10.

Dr. T. E. Pennington, Naylor, aged 70, died May 9 at a hospital in Valdosta of cerebral hemorrhage.

Dr. Wm. Allen Post, Grantville, aged 48, died April 7.

KENTUCKY

Hart County Medical Society has elected Dr. L. E. Comstock, President; Dr. S. F. Richardson, Secretary.

Laurel County Medical Society has elected Dr. H. V. Pennington, President; Dr. William Johnson, Vice-President; Dr. Oscar D. Brock, Secretary.

Third District Medical Society has elected Dr. H. M. Meredith, Scottsville, President; Dr. Logan Felts, Russellville, Vice-President; Dr. J. H. Blackburn, Bowling Green, Secretary.

Dr. Henry P. Sights, Paducah, has been elected President of the Lions Club of that city.

Dr. Wilfred J. McIvor, formerly of Winnipeg, Canada, has joined the staff of the Moseley Hospital, Henderson, to succeed Dr. James P. Vye, who returned to Canada.

Dr. Oliver R. Kidd, Paducah, has been elected President of the Southwestern Kentucky Medical Association and Dr. Lee P. Molloy, Paducah, Secretary.

Russellville Rotary Club had a Doctors' Day program in May of which nearly every physician in Logan County was a guest.

Dr. Jay W. Carter, Greenup, and Mrs. Minnie Russell, of Johnson City, Tennessee, were married April 25.

Deaths

Dr. William Sweeney Stucky, Lexington, aged 43, died June 10 of cerebral hemorrhage. He was a son of Dr. J. A. Stucky, with whom he was associated in practice.

Dr. Allen Watson McCleese, Morehead, aged 53, died May 3 of carcinoma of the stomach.

LOUISIANA

Iberville Parish Medical Society has elected Dr. W. E. Barker, Jr., Plaquemine, President; Dr. Eugene Holloway, Plaquemine, Vice-President; Dr. Guy A. Darcantel, White Castle, Secretary-Treasurer.

The following are Chairmen of Scientific Sections for the meeting of the Louisiana State Medical Society 1928, having been appointed by the President: Dr. J. H. Musser, New Orleans, Medicine and Therapeutics; Dr. L. R. DeBuys, New Orleans, Pediatrics; Dr. R. H. Bryant, Pineville, Nervous and Mental Diseases; Dr. W. H. Harris, New Orleans, Bacteriology and Pathology; Dr. Fred J. Mayer, Opelousas, Public Health and Sanitation; Dr. D. N. Silverman, New Orleans, Gastro-Enterology; Dr. Louis Abramson, Shreveport, General Surgery; Dr. W. B. Chamberlain, Baton Rouge, Gynecology and Obstetrics; Dr. F. C. Bennett, Monroe, Eye, Ear, Nose and Throat; Dr. H. W. E. Walther, New Orleans, Urology; Dr. W. R. Harwell, Shreveport, Radiology; Dr. Guy A. Caldwell, Shreveport, Orthopedic Surgery.

During this summer Tulane University of Louisiana School of Medicine, New Orleans, will offer courses in anatomy, embryology, histology, neuro-anatomy, dissection, biochemistry, physiology and medicine. For information write Dr. C. C. Bass, Dean, 1551 Canal Street, New Orleans.

A conference on health in the flooded area of the Mississippi Valley was held in New Orleans June 5.

(Continued on page 34)

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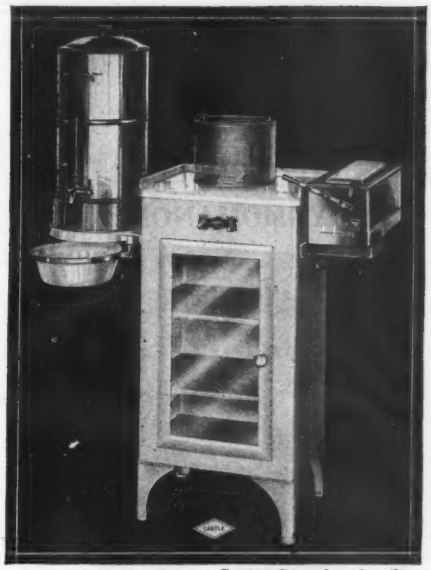

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Our Bulletin 5 is a resume of the literature on blood pressure in surgery. Copy sent free on request.

Medical Department

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(Continued from page 668)

Resolutions were passed providing for a rehabilitation program in the seven states affected, according to which a health unit would be established in each county, consisting of a full-time health officer, sanitary inspector, public health nurse and office assistants, and a field training station in the northern part of Louisiana. The program would be financed by the state, the county and the Rockefeller Foundation, and the Red Cross when necessary, with the understanding that the parish will take over the expenses gradually and as soon as possible.

Dr. H. W. E. Walther, after giving four years of his time and services as Editor of the New Orleans Medical and Surgical Journal, has resigned.

Contract has been awarded for the new $123,000 interns' home for the Charity Hospital, New Orleans.

Deaths

Dr. Percival Butler McCutchon, New Orleans, aged 75, died May 12 at the Touro Infirmary of acute intestinal obstruction.

Dr. Florena Gates Rich, New Orleans, aged 29, died May 12 of acute leukemia and pericarditis.

MARYLAND

The Medical and Chirurgical Faculty of Maryland has elected Dr. Peregrine Wroth, Jr., Hagerstown, President-elect, and Dr. John King, Baltimore, Secretary.

Dr. William S. Thayer, Baltimore, was elected President of the American Medical Association at its recent meeting in Washington, D. C.

The South Baltimore General Hospital, Baltimore, is to have a new four-story nurses' home costing approximately $150,000 and a $100,000 addition to the Hospital.

The State Legislature of Maryland has appropriated $850,000 to complete the Epileptic Colony at the Springfield State Hospital, Sykesville, to erect two cottages at the Hospital and two dormitories at the Rosewood State Training School for the Feeble-Minded, and to construct an additional building at the Crownsville State Hospital for the Negro Insane, Waterbury.

At the Washington session of the American Medical Association, members subscribed a fund of $16,000 to be presented to Johns Hopkins University, Baltimore, for a scholarship named in honor of Dr. William S. Thayer, Professor Emeritus of Medicine.

An appropriation of $30,000 has been made by the Commonwealth Fund, New York, to provide a Mental Hygiene Clinic for the Mental Hygiene Society of Maryland, and an additional $23,000 will be advanced if the work is satisfactory and the support is needed. The Clinic will be established at the University of Maryland School of Medicine, Baltimore, and be in operation in October. Dr. Ralph C. P. Truitt, New York, will be the Director.

Dr. James G. Howell, Director of Relay Sanatorium, Relay, resigned June 1 to devote his time to general practice.

Dr. Timothy A. Callahan has been appointed Health Officer of Hartford County to succeed Dr. Walter B. Kirk, Darlington.

Dr. Walter M. Simpson, Baltimore, has accepted the position of Pathologist at the Miami Valley Hospital, Dayton, Ohio.

Dr. Hugh H. Young, Johns Hopkins University School of Medicine, was guest of honor at a dinner at the Hotel Belvedere recently which was attended by about fifty of his former students and associates. The toastmaster was Dr. Alexander Randall, Philadelphia, Pennsylvania, and the Chairman of the Committee, Dr. Montague L. Boyd, Atlanta, Georgia.

Dr. Thomas R. Pratt, Jr., Charlottesville, Virginia, has been appointed Superintendent of the Eastern Shore Tuberculosis Sanatorium, Salisbury, to succeed Dr. Alva B. Burris, who will devote his time to private practice.

Dr. Hyman M. Cohen, formerly of Baltimore, now of Manchester, England, was a delegate of the British Medical Association to the Washington meeting of the American Medical Association.

Dr. Edwin J. Ward, Crisfield, has been appointed

(Continued on page 36)

Scientific Shorthand

Pictures were man's first method of expressing his ideas. They were given up because of the difficulty of making them. Today, despite the refinements of language, they are coming back into their own as the one method of expression conveying the same idea to all. Naturally the pictures of today made by photographic methods are scientifically accurate and very easy to make. In the physician's case report they serve as scientific shorthand in describing conditions as they were during the treatment. It is in the interest of medical progress that photographs be used in all such documents.

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(Continued from page 34)

County Health Officer to succeed Dr. Clarence E. Collins, and will take up his duties next January.

Dr. William H. Welch, Baltimore, will leave soon to study methods of teaching the history of medicine in various European universities.

The following Baltimore physicians connected with the State and City Health Departments were sent to Memphis, Tennessee, May 24 to assist in the flood area: Dr. W. C. Stone, Dr. Victor H. de Somoskeoy, Dr. Valcoulon Ellicott, Dr. Ralph G. Beachley, Dr. John Collinson and Dr. James A. Doull.

Deaths

Dr. Benjamin F. Phillips, Baltimore, aged 72, died May 25 of heart disease.

Dr. Edwin Myley Schindel, Hagerstown, aged 72, died May 7.

Dr. Frank T. Turner, White Hall, aged 69, died April 30.

MISSISSIPPI

Dr. Henry Boswell, of the Mississippi State Tuberculosis Sanatorium, spent several days in Indianapolis, Indiana, attending sessions of the American Sanatorium Association and the National Tuberculosis Association. Dr. Boswell was elected President of the American Sanatorium Association, this being the first time that this honor has ever been conferred upon a Southerner. He was also reelected to a place on the Executive Board of the National Tuberculosis Association, and the only Southerner to be accorded a place upon this Board.

Dr. Taswell P. Haney, Jr., Burnsville, has been elected full-time Health Officer of Tishomingo County.

Dr. Virgil Leroy Payne, Greenville, and Miss Ella Hunt Howell, Pine Bluff, Arkansas, were married April 19.

Deaths

Dr. Henry Lee Crook, Jackson, aged 58, died May 5 at a local hospital of pulmonary embolism following a prostatectomy.

Dr. Benjamin J. McClesky, Atlanta, Aged 81, died May 11 of heart disease.

Dr. Frank T. Carmack, Iuka, aged 70, died April 2 of paralysis.

Dr. Charles Clifton Wells, Darbun, aged 46, died May 8.

MISSOURI

Pemiscot County Medical Society has elected Dr. M. H. Hudgings, Caruthersville, President; Dr. W. R. Limbaugh, Hayti, Vice-President; Dr. J. W. Johnson, Hayti, Secretary.

The meeting of the Missouri Hospital Association, with which was combined this year the meeting of the Kansas Hospital Association and the Oklahoma Hospital Association, held at Kansas City May 27-28, was very successful and in the future will hold joint meetings. The officers are Dr. B. A. Wilkes, St. Louis, President; Dr. Fred S. Clinton, Tulsa, Oklahoma, First Vice-President; Dr. A. R. Hatcher, Wellington, Kansas, Second Vice-President.

Mercy Hospital, Kansas City, is to receive $25,000 from the estate of the late Charles W. Armour, and St. Luke's Hospital, Kansas City, is to receive $5,000.

The St. Louis Medical Society has voted in favor of erecting the proposed $1,200,000 hospital for negroes on a site adjoining the main city hospital.

A gold medal was awarded Dr. Evarts A. Graham, St. Louis, and certificates of merit were awarded to his associates by the St. Louis Medical Society for discovering a method of visualization of the gall bladder by the x-ray.

Dr. Jabez N. Jackson, Kansas City, received the honorary degree of Doctor of Law at the commencement exercises of the University of Missouri June 8.

Dr. William Engelbach, St. Louis, received the honorary degree of Doctor of Science from his alma mater, the Illinois College, at Jacksonville, Illinois.

Dr. Max Goldstein, St. Louis, was elected President of the American Otological Society.

Dr. F. B. Fuson, Nevada, was appointed Health Supervisor on April 21 to succeed Dr. Geo. A. Johns.

On June 6 the St. Louis University celebrated the laying of the cornerstone of its new medical building which, when completed, will represent an investment

(Continued on page 38)

Quoting from the new book

"SIMPLIFIED INFANT FEEDING"

(THIRD EDITION)

By ROGER H. DENNETT, B.S., M.D.

Professor of Diseases of Children and Director of the Department in the New York Post-Graduate Medical School; Attending Physician in the Babies' Wards of the New York Post-Graduate Hospital; Consulting Pediatrician to the Victory Memorial Hospital, Brooklyn, The Passaic General Hospital, The New York Episcopal Orphans' Home and Asylum, etc., Fellow of The New York Academy of Medicine.

"The Dietary Value of Gelatine has long been recognized although until now, the basic reasons have been somewhat clouded by varying theories. Among the recognized protective colloids, none has a higher degree of colloidal potency than edible gelatine. It has now been conclusively established that the value of edible gelatine in infant feeding is due to its colloidal action in emulsifying the milk curds, and to the presence (to the extent of 5.9) of lysine, an amino acid which promotes growth. Similarly protective colloids in the form of albumins and gelatine are of the highest importance in maintaining an emulsion of the fats which are ingested, and in that way preventing digestive disorders that would result from non-emulsification of the fat masses. Edible gelatine is the most important member of the group of colloids, the dietary importance of which is becoming more and more appreciated by all pediatricians and food authorities. Aside from this it is of itself the most easily digested of all proteins. Working on this basis it has been demonstrated that one of the most valuable uses to which gelatine can be put is in combination with the milk formulas in the feeding of infants. It is of value to the infant in at least two ways. In the first place, because of its powerful colloidal action, gelatine causes the casein to curd in small soft, and easily digestible curds and thus prevents the formation of the hard, tough curds which so often cause digestive disturbances and are of more or less common occurrence in infants' stools. Although gelatine may not in exceptional cases absolutely prevent the formation of curds, these indigestible masses will surely be reduced in size and softened in substance for easy digestion by the addition of a small amount of dissolved gelatine in the milk formula. Gelatine is of particular value in the diet of the growing child, because of its relatively high content of lysine, one of the amino acids necessary for growth.

"FOR infants three weeks to six months old add one-half teaspoonful of gelatine to the day's milk formula. For babies six months old and up add one teaspoonful of gelatine to the day's milk formula. First soak the gelatine for about ten minutes in one ounce of cold milk taken from the day's formula. Then add one ounce of hot milk from the day's formula. Stir until dissolved and add this solution to the full quantity of the day's formula, stirring until thoroughly mixed."

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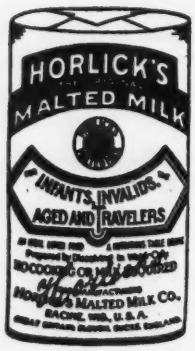

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(Continued from page 36)

of over $600,000. The building will be completed in time for the opening of the session of the school next fall.

Dr. Elmer T. McGaugh has been appointed Superintendent of State Hospital No. 1, Fulton, succeeding Dr. M. O. Biggs.

Dr. Robert E. Schwart has been appointed Superintendent of the Koch Hospital, St. Louis, succeeding Dr. H. D. Spector.

Dr. Emmett P. North and Miss Carolyn Tweedie, both of St. Louis, were married May 19.

Deaths

Dr. Frank L. Henderson, St. Louis, aged 62, died May 13 at Stonington, Connecticut, of heart disease.

Dr. John Edward Hollingsworth, Vandalia, aged 65, died recently of multiple sclerosis.

Dr. Robert L. Pipkin, Springfield, aged 58, died suddenly May 4 of cerebral hemorrhage.

NORTH CAROLINA

Sixth District Medical Society has elected Dr. S. P. Burt, Louisburg, President; Dr. H. H. Foster, Norlina, Vice-President; Dr. B. W. Fassett, Durham, Secretary-Treasurer.

The Legislature has appropriated $1,500,000 for improvements to the state charitable institutions, about $350,000 being for a new wing to the State Hospital for the Insane at Raleigh, replacing the wing burned some months ago; other institutions receiving funds are the Insane Hospital for Negroes at Goldsboro, $170,000 for a new building; the State Orthopedic Hospital at Gastonia, $105,000 for a central heating plant, servant quarters and surgeon's residence; the School for the Deaf at Morgantown receives $80,000, and the State School for the Blind at Raleigh $250,000.

At the annual meeting of the North Carolina State Medical Society, Dr. Wilburt C. Davison, Baltimore, Maryland, outlined plans for the proposed Duke University School of Medicine at Durham. He was recently appointed Dean of the new School. Construc-

(Continued on page 40)

Johnson's Burn Emollient

recently announced, has met with such widespread approval, that in compliance with numerous professional requests, it is now being supplied not only in collapsible tubes, as formerly, but also in 1-lb. cans. Ingredients on application.

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were originated to assure the scientific study of hayfever—previously impossible—owing to the lack of individualized diagnostic material or specific treatment extracts. And the accompanying pictures illustrate the first steps necessary to be taken, both far and wide, to assure that our variety of pollens shall cover *all sections* and *all seasons*, adequately and accurately.

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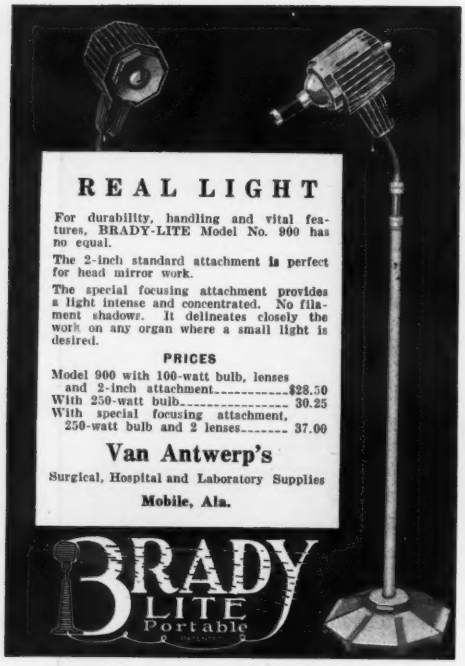
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(Continued from page 38)

tion will begin soon on a 350-bed hospital, and the School of Medicine is expected to open in 1929.

Dr. J. W. McNeill, Fayetteville, was guest of honor at a dinner given to the Cumberland County physicians by Dr. James D. C. Highsmith on May 3 in celebration of his fiftieth anniversary in the practice of medicine. Dr. McNeill was presented a loving cup by physicians of the community as a token of esteem.

The Babies' Hospital at Wrightsville Beach, near Wilmington, was completely destroyed by fire May 28 at a loss of about $40,000. No lives were lost. Plans have been made for the immediate construction of a larger and fire-proof babies' hospital. Dr. James B. Sidbury, head of the former hospital corporation, has offered to donate the site to a new corporation which, if accepted, would make it more of a community institution than a private hospital.

Dr. Joshua F. Abel, Waynesville, has been appointed a Councilor of the Tenth District to succeed the late Dr. Arthur T. Pritchard.

The North Carolina Public Health Association has elected Dr. John H. Hamilton, Wilmington, President, and Dr. Frank M. Register, Raleigh, Secretary-Treasurer, reelected.

Dr. Thomas W. M. Long has been elected President of the First National Bank of Roanoke Rapids.

Dr. Joseph Howell Way, President of the State Board of Health, has been made a member of the Alpha Omega Alpha Medical Fraternity at Vanderbilt University as a representative of the class of 1886.

The Infants' and Children's Sanitarium at Saluda, Dr. D. Lesesne Smith, Physician in Charge, has obtained for this season the services of Miss Madge Duke, of New York City, who has had ten years' experience in nutritional work with children.

OKLAHOMA

New Morningside Hospital, Tulsa, now undergoing construction, is expected to be completed by November 1. It will contain 250 rooms.

Dr. W. H. Kingman, Bartlesville, has been ap-

(Continued on page 42)

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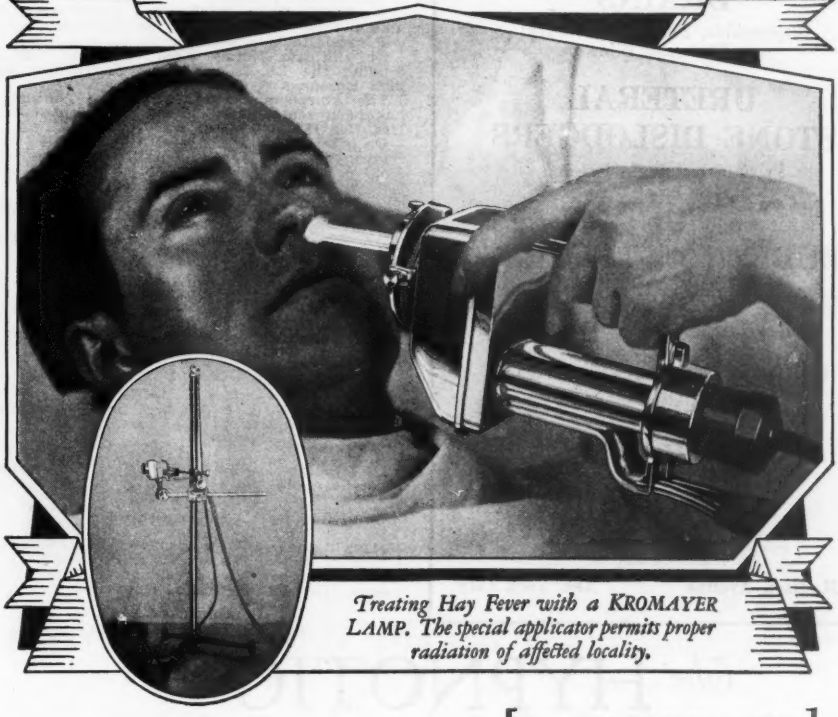

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(Continued from page 40)

pointed County Superintendent of Health, vice Dr. O. S. Somerville, resigned.

Dr. R. W. Jones, Stigler, has accepted appointment as full-time Health Officer for Seminole County. He will reside in Wewoka.

Dr. and Mrs. Horace Reed, Oklahoma City, are attending the European Rotary Convention, and will visit European centers.

The American Legion Hospital at Norman, which has been temporarily closed, has been reopened by Drs. Ben H. Cooley and W. T. Mayfield.

Dr. Clark Homer Hall, Oklahoma City, and Miss Susanmary Roberts, of Nevada, Missouri, were married June 9.

Deaths

Dr. Stephen Smith Sanger, Yukon, aged 52, died suddenly June 3.

Dr. James Hamilton Maxwell, Oklahoma City, aged 53, died May 5 of acute nephritis.

SOUTH CAROLINA

Dr. Nathaniel B. Heyward, Columbia, has been appointed a member of the State Board of Medical Examiners succeeding Dr. Julius H. Taylor, Columbia. Dr. Robert E. Abell, Chester, was reappointed a member of the Board.

Dr. Benjamin Huger Rutledge, Jr., Charleston, and Miss Eleanor Louise Oliver, of Baltimore, Maryland, were married May 28.

Deaths

Dr. William B. Smith, Dillon, aged 75, died March 26 of heart disease.

TENNESSEE

East Tennessee Medical Association has elected Dr. Harry D. Miller, Johnson City, President; Dr. W. H. Reed, Kingsport, Vice-President of Upper East Tennessee; Dr. Joe T. Smith, Knoxville, Vice-President,

(Continued on page 44)

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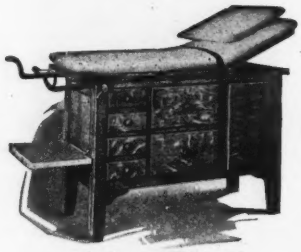

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(Continued from page 42)

Lower East Tennessee; Dr. Jesse C. Hill, Knoxville, Secretary-Treasurer.

Middle Tennessee Medical Association has elected Dr. E. M. Sanders, Nashville, President; Dr. J. K. Blackburn, Pulaski, Vice-President; Dr. Sam P. Bailey, Nashville, Secretary. McMinnville was chosen as the place for the November meeting.

West Tennessee Medical and Surgical Association has elected Dr. W. C. Duckworth, Jackson, President; Dr. J. P. Baird, Dyersburg, First Vice-President; Dr. H. C. Curry, Covington, Second Vice-President; Dr. I. A. McSwain, Paris, Secretary; Dr. G. R. McSwain, Paris, Assistant Secretary.

There will be held an examination by the American Board of Ophthalmological Examinations at the time of the Southern Medical Association meeting in Memphis November 14-17. Information may be obtained from Dr. W. H. Wilder, Peoples Gas Building, Chicago, Illinois.

The Memphis Hospital Association is a new organiation just recently perfected. Dr. Henry G. Hedden is Chairman; Dr. J. F. Ward, Vice-Chairman, and Mr. Geo. F. Sheats, Secretary-Treasurer. In cooperation with the Chamber of Commerce, this Association has invited the American Hospital Association to meet in Memphis next year.

Dr. Harry H. Shoulders, Nashville, Secretary-Editor of the Tennessee State Medical Association, announces that Dr. William M. Hardy has been appointed a full-time Assistant Secretary-Editor. Dr. Hardy has been a medical missionary in China for sixteen years.

Dr. John L. Jelks, Memphis, will give clinical, operative and bedside demonstrations and study of gastro-intestinal and rectal disease at the St. Joseph's Hospital each Tuesday at 2:00 p. m., beginning September 16.

Riverside Hospital, Knoxville, now has under construction a new addition to be used for private and operating rooms.

Dr. E. C. Ellett, Memphis, sailed for Europe from Quebec June 29. He will tour Europe and return to Memphis about the middle of September.

Dr. Bryce W. Fontaine, Memphis, has been elected

(Continued on page 46)

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Keeping Qualities—Characteristic of all Merrell-Soule Products, the container and manner of packing insure its keeping qualities.

Results—One experience usually betokens continued and increased use.

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Yonkers, New York

(Continued from page 44)

to active membership in the American Clinical and Climatological Association.

Dr. Hiram B. Everett, Memphis, was elected Chairman of the Tennessee State Association of Railway Surgeons at the annual meeting in Chattanooga.

Dr. Eldon D. Connell has resigned his position as School Medical Officer in the City Health Department, Memphis.

Dr. J. A. McIntosh, Memphis, and Miss Anne K. Smith were married June 8.

Dr. Thaddeus Ray Bowers and Miss Ruth Nelson, both of Bristol, were married May 14.

Deaths

Dr. James W. Cartright, Murfreesboro, aged 69, died May 17.

Dr. Eli Otis Cherry, Newbern, aged 66, died May 21.

Dr. Charles B. Lenox, Ashland City, aged 63, died May 18 of heart trouble.

Dr. W. B. McClure, Chattanooga, aged 78, died at Orlando, Florida, April 26.

Dr. James W. Pierce, Rutledge, aged 85, died May 5.

Dr. Elmo Smith, who formerly lived near Livingston, was killed in an automobile accident at St. Joe, Texas, May 6.

Dr. William B. St. John, Bristol, aged 61, died May 12 of heart disease.

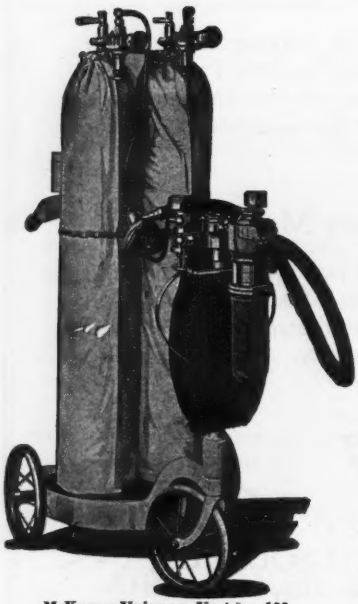
Dr. John Paxton Tillery, Knoxville, aged 64, died May 29.

TEXAS

The Texas Railway Surgeons Association has elected Dr. C. P. Yeager, Kingsville, President; Dr. S. P. Cunningham, San Antonio, Vice-President; Dr. Ross Trigg, Fort Worth, Secretary-Treasurer.

Texas Radiological Society has elected Dr. Davis Spangler, Dallas, President; Dr. J. B. Johnson, Galveston, First Vice-President; Dr. C. F. Lehman, San Antonio, Second Vice-President; Dr. C. P. Harris, Houston, Secretary-Treasurer.

(Continued on page 48)



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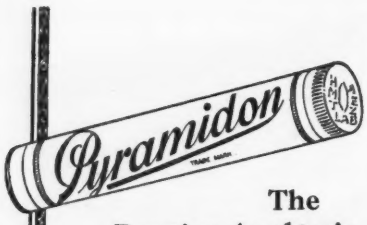

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(Continued from page 46)

Texas Pediatric Society has elected Dr. Lucius D. Hill, San Antonio, President; Dr. Ramsey H. Moore, Dallas, Vice-President; Dr. Edwin G. Schwarz, Fort Worth, Secretary-Treasurer.

In order to provide space for a large number of students and to improve the facilities for teaching, the east wing of the main Medical College building at Galveston is being remodeled.

Dr. Hatch W. Cummings, Hearne, who has served as President of the Planters and Merchants State Bank since 1910, has retired in order to devote more time to the practice of medicine and to his duties as President of the State Board of Medical Examiners.

Dr. Reuben B. Anderson, Jr., has been appointed Assistant Secretary-Editor of the State Medical Association.

Dr. Richard H. Harrison, Bryan, has been appointed County Health Officer of Brazos County.

A site for a hospital at Stephenville will cost about $25,000, and ready for occupancy in August, was donated by the Chamber of Commerce.

Dr. D. L. Heidrick is erecting a new hospital building in Mercedes.

Dr. A. O. Singleton, who has been an Associate Professor of Surgery in the Medical Department of the University of Texas for a number of years, has been officially informed by the Board of Regents of his election to the Chair of Surgery in that Institution, which was made vacant by the death of Dr. James E. Thompson.

Dr. H. V. Campbell has resigned the superintendency of the West Texas Baptist Sanitarium, Abilene, and will return to the Baylor University Hospital, Dallas, as Assistant Superintendent, a position which he occupied some years ago.

Dr. Lewis A. Sanders, Dallas, formerly Anesthetist and Teacher of Anesthesia at Baylor Hospital, is the new Superintendent of West Texas Baptist Sanitarium at Abilene.

Mrs. M. H. Bright has been appointed Assistant Superintendent of the new Houston Negro Hospital, Houston, and Superintendent of Nurses.

(Continued on page 50)

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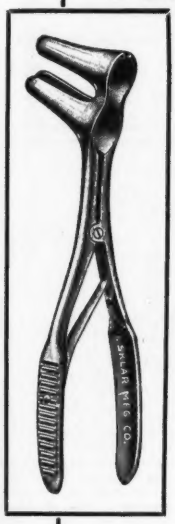

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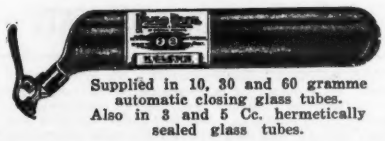

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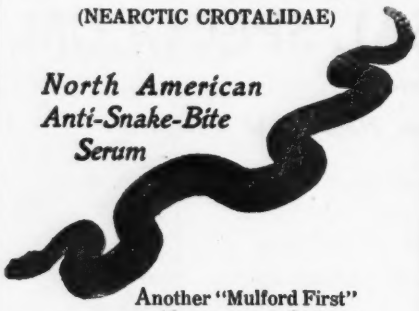

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This product is a concentrated anti-snake-bite serum, developed by Dr. Afranio do Amaral, of Brazil, Director of the Antivenin Institute of America. It is polyvalent against the venoms of the rattlesnakes, copperhead and moccasin—snakes of the family Crotalidae in North America.

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THE PIONEER BIOLOGICAL LABORATORIES

(Continued from page 48)

Deaths

Dr. R. H. Crabb, Leonard, aged 67, died June 5 of heart failure.

Dr. James F. Dunn, Burleton, aged 75, died suddenly May 7 of heart disease.

Dr. Allan Hubert Galloway, Jr., Laneville, aged 50, was shot and killed recently.

Dr. Pleasant M. Hawkins, Arp, aged 70, died March 21.

Dr. Simeon S. Martin, Georgetown, aged 60, died April 30 of cerebral hemorrhage.

Dr. James Elmo Smith, Saint Jo, aged 43, died in May at a hospital in Gainesville of injuries received in an automobile accident.

VIRGINIA

Augusta County Medical Association has elected Dr. H. G. Middlekauff, Weyers Cave, President, and Dr. W. F. Hartman, Staunton, Secretary.

Russell County Medical Society has elected Dr. T. T. McNeer, Dante, President, and Dr. S. C. Couch, Cleveland, Secretary.

Nelson County Medical Society has elected Dr. J. F. Thaxton, Tye River, President; Dr. W. D. Meeks, Massies Mill, Secretary-Treasurer.

Walter Reed Medical Society has elected Dr. W. W. Kerns, Bloxom, President; Drs. C. B. Courtney, Newport News, H. G. Longaker, Newport News, R. A. Davis, Newport News, M. W. Crafford, Lee Hall, and L. O. Powell, Seaford, Vice-Presidents; Dr. L. E. Stubbs, Newport News, Secretary, reelected; Dr. J. E. Marable, Newport News, Treasurer, reelected.

The Virginia Society of Oto-Laryngology and Ophthalmology has elected Dr. C. S. Dodd, Petersburg, President; Dr. Frank Hanger, Staunton, Vice-President; Dr. Fletcher D. Woodward, University, Secretary-Treasurer, reelected. The 1928 meeting will be held in Newport News.

The Medical College of Virginia, Richmond, will receive from the Martha Allen Wise estate as a residuary legates approximately $130,000 for the care and treatment of patients at the St. Philip Hospital, a large modern colored institution owned and operated by the College for teaching purposes.

New appointments at the Medical College of Virginia, Richmond, include Dr. William B. Porter, Professor of Medicine; Dr. J. C. Forbes, Assistant Professor of Chemistry; Dr. Lewis C. Pusch, Associate in Pathology, and J. G. Jantz, Associate in Anatomy. In addition to these full-time members of the faculty,

(Continued on page 52)

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TO THE MEDICAL PROFESSION: We are filling a long felt want by conducting a training class teaching blood counts, urinalyses, sputum and feces examinations, also basal metabolism readings. We will gladly furnish you with competent office assistants trained in such laboratory procedures as you may require. Our classes are made up of stenographers, bookkeepers, registered nurses and clerks. Send us your office assistant for training. Write or telephone for full information. Dial 3-3598. John V. Mix, Director, Alabama Pathological Laboratory, 1005 Martin Building, Birmingham, Ala.

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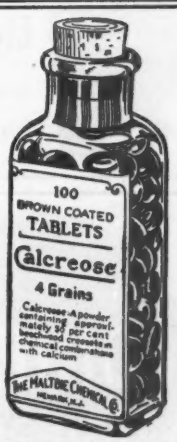

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(Continued from page 50)

President W. T. Sanger has announced a number of important appointments and promotions on the visiting staff of the Col'ege.

At the commencement exercises of the Medical College of Virginia, Richmond, Dr. Hugh S. Cumming, Surgeon General, United States Public Health Service, an alumnus in medicine both of the University of Virginia and the Medical College of Virginia, was awarded the honorary degree of Doctor of Science.

The Southside Virginia Medical Association held its ninety-fourth quarterly session at Emporia June 14.

A campaign is being conducted for funds to build a thirty-four room hospital at Luray.

The Halcyon Hospital, South Boston, has reopened as the South Boston General Hospital.

Dr. Christopher's Hospital, Norfolk, is to be discontinued as a hospital and operated as a clinic for the study of medical and surgical cases.

Dr. R. W. Browne, formerly with the Public Health Service at Norfolk, and who has lately been in charge of the U. S. Veterans' Hospital at St. Paul, Minnesota, has been transferred to Ft. Bayard, New Mexico, and will be Medical Officer in Charge of the U. S. Veterans' Hospital at that place.

Dr. A. L. Gray, Richmond, was made President-elect of the American College of Radiology at their meeting held in Washington, D. C., during the meeting of the American Medical Association.

Dr. Stephen H. Watts has resigned as Professor of Surgery and Gynecology at the University of Virginia, his resignation to take effect September 1.

Dr. Edith J. Lacy, Assistant Physician at the Eastern State Hospital, Williamsburg, resigned her position at the hospital, effective June 1. She expects to go to India for medical service.

Dr. Israel Brown, Norfolk, has been appointed a member of the national distinguished guest committee of the American Legion, he being the third Virginian to hold a post in the national legion organization.

Dr. E. L. Caudill, Narrows, has been elected President of the Cavalier Hosiery Mills, which is to be opened at that place.

Dr. Thomas Duckett Jones, Petersburg, has been awarded a fellowship for foreign study by the National Research Council, and will leave September 1 for London, where he will spend a year studying diseases of the heart with Sir Thomas Lewis.

Deaths

Dr. Leslie C. Brock, Smithfield, aged 54, died May 24 of cerebral hemorrhage.

Dr. Harry Marbury Tayloe, Hague, aged 51, died April 21 of pneumonia.

Dr. John E. Mapp, Keller, aged 81, died April 30 of cirrhosis of the liver.

Dr. Robert T. Glassell, Bowling Green, aged 73, died June 4 after an illness of a year.

Major Albert Gallatin Franklin, of the U. S. Army Medical Corps, formerly of Richmond, aged 54, died June 1 at Walter Reed Hospital, Washington, D. C.

(Continued on page 54)

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(Continued from page 52)

WEST VIRGINIA

West Virginia State Medical Association elected Dr. C. A. Ray, Charleston, President; Dr. D. G. Preston, Lewisburg, First Vice-President; Dr. E. L. Armbrecht, Wheeling, Second Vice-President; Dr. W. C. Swan, Huntington, Third Vice-President; Dr. T. M. Garber, Charleston, Treasurer.

Ohio County Medical Society has elected Dr. John Gilmore, President; Dr. George Viewig, Vice-President; Dr. Robert Armbrecht, Treasurer; Dr. John G. Thoner for the third time Secretary.

There will be built at Williamson to replace the hospital recently destroyed by fire, a one hundred bed institution costing $125,000.

The West Virginia State Medical Association sponsored a bill recently passed by the legislature to establish a tuberculosis sanatorium in the southern part of the State. The $216,000 earned by State Hospital No. 1 at Welch will be applied toward its construction.

Deaths

Dr. Lawrence A. Baker, Middlebourne, aged 49, died May 15 at the Ohio Valley General Hospital, Wheeling, of chronic nephritis, chronic cholecystitis and myocarditis.

GENERAL

The French Ambassador to the United States, through the State Department, has requested that the Public Health Service invite the attention of the academies, faculties and associations of medicine in the United States to the Nineteenth Congress of Medicine which will be held in Paris in October.

Dr. Harlow Brooks has been appointed Professor of Internal Medicine in the New York Polyclinic Medical School and Hospital.

The New York Polyclinic Medical School and Hospital has opened a new Physical Therapy department under the direction of Dr. Richard Kovacs, Adjunct Professor of Physical Therapy. This department will serve for post-graduate teaching of physicians and nurses and for clinical work in connection with a large general hospital.

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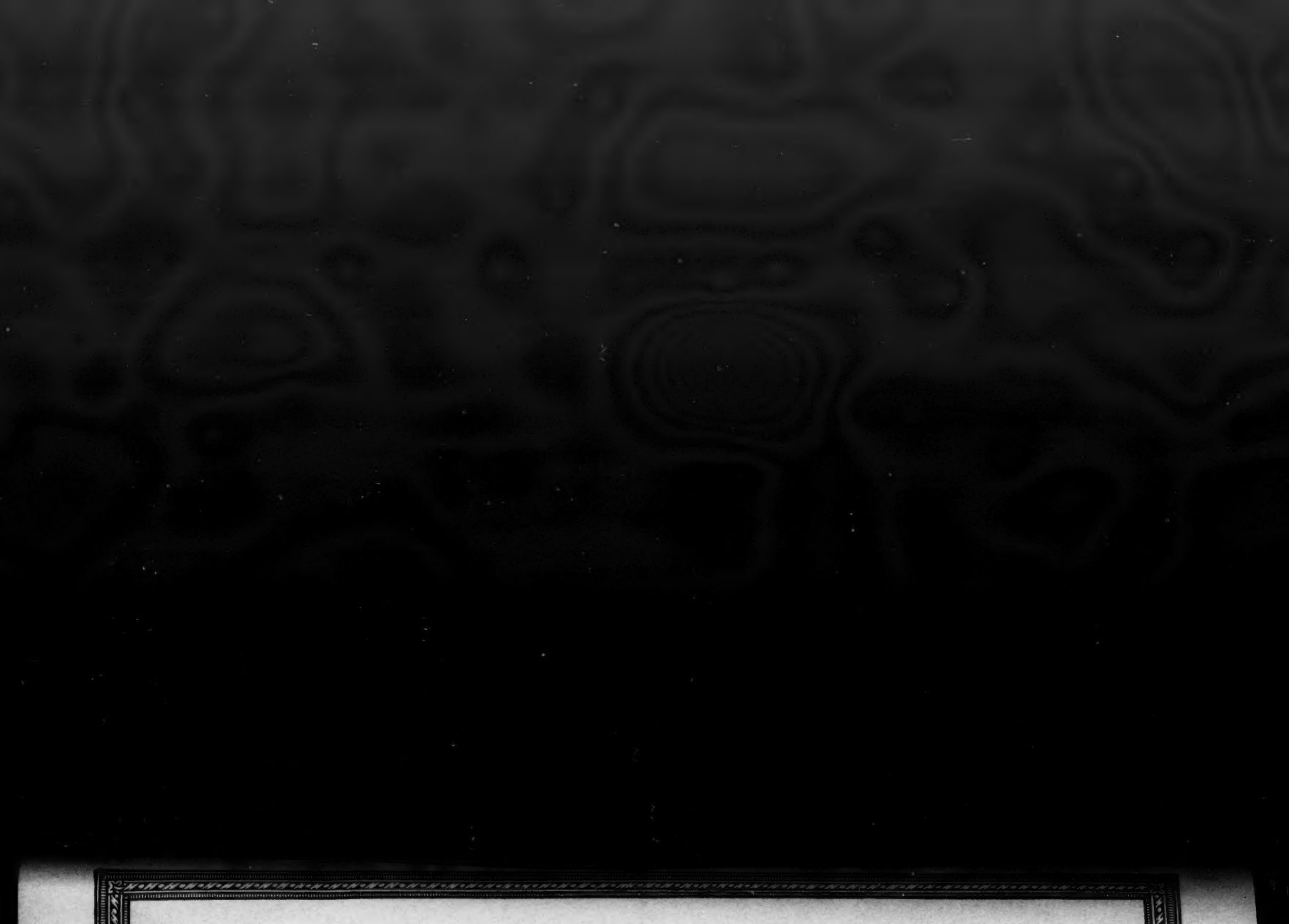
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